2.0 ALTERNATIVES CONSIDERED

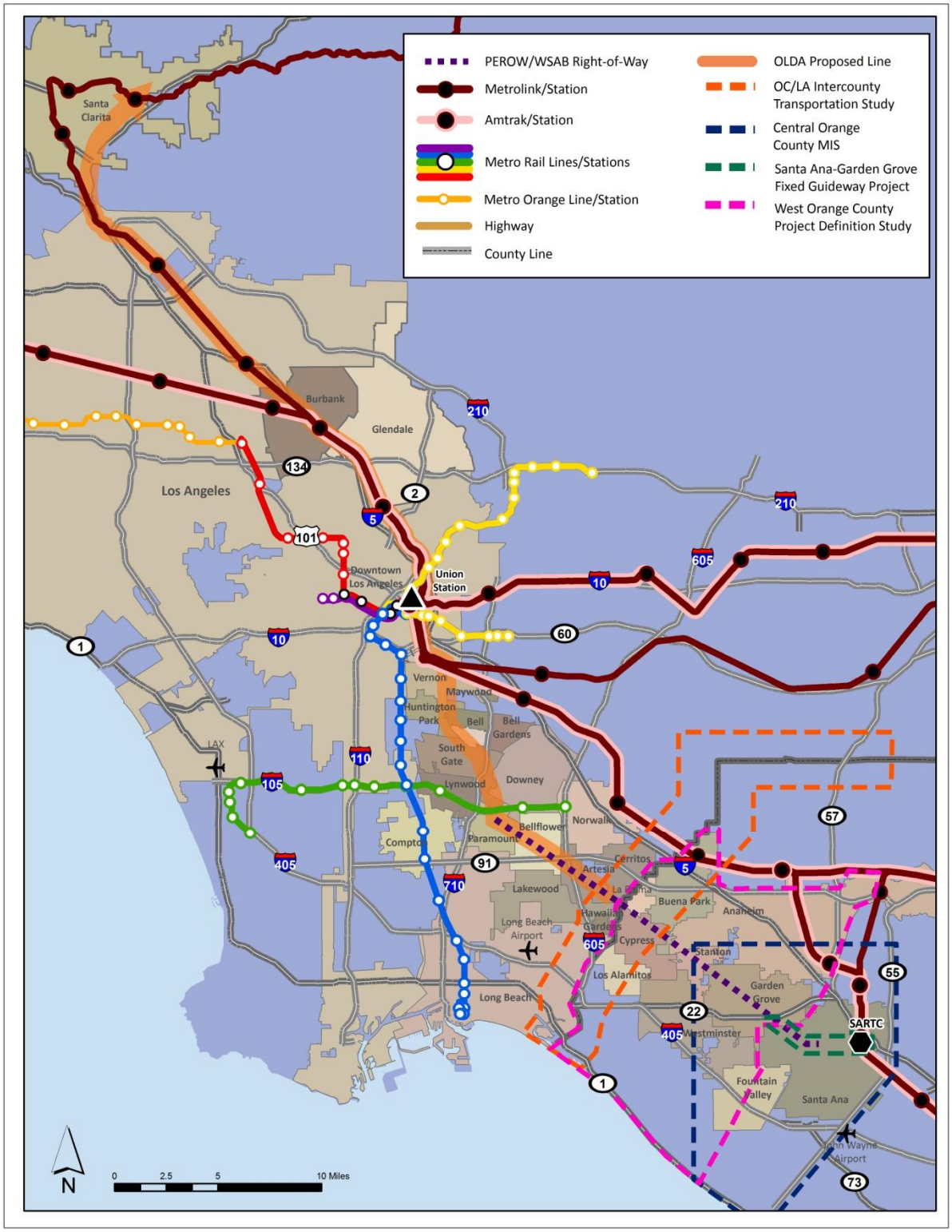
This chapter documents the development of the Recommended Alternative(s) for the PEROW/WSAB Corridor. A wide range of possible transportation alternatives was identified based on past corridor studies and in consultation with elected officials, stakeholders, city and agency staff, and the community during the project initiation phase. The resulting transit options were evaluated and refined through a three-step screening process to identify the Recommended Alternative(s) that best meets the mobility needs and goals for transit improvements in the Corridor. The first two screening efforts were documented in the *PEROW/WSAB Corridor AA Initial Screening Report* completed in July 2011. The final level of evaluation of the Final Alternatives is documented in this AA report.

2.1 Previous Study Efforts

Starting in 1996, numerous studies have identified the need for improved travel connections between Los Angeles and Orange counties, including the reuse of all or portions of the PEROW/WSAB Corridor for transit purposes once again. The studies concluded that travel between the two counties, as well as within the study area, was constrained and strongly in need of capacity improvements. As illustrated in Figure 2.1, the most recent studies evaluating reuse of the Corridor are:

- West Orange County Project Definition Study (2003) – This OCTA study evaluated potential rail options in the western portion of Orange County. The final study recommendation proposed use of the Orange County portion of the PEROW/WSAB Right-of-Way (ROW) with a Light Rail Transit (LRT) system.
- Orangeline High Speed Magnetic Levitation Project (2005-2006) – The Orangeline Development Authority (OLDA), a joint powers agency, prepared preliminary planning and engineering reports for a high speed magnetic levitation (maglev) system between the cities of Palmdale and Santa Ana using various alignments including the PEROW/WSAB ROW.
- Orange and Los Angeles Intercounty Transportation Study (2008) – This joint study by OCTA and Metro evaluated alternatives for improving transportation infrastructure and services between the two counties, including possible reuse of the PEROW/WSAB ROW with Bus Rapid Transit (BRT), LRT, and other transit service options. The study demonstrated the need for and feasibility of transit system improvements along the ROW.
- Central County Corridor Major Investment Study (2010) – This OCTA study assessed the need for transportation improvements in central Orange County. One proposed transit project, identified for further study, recommended reuse of the Orange County portion of the PEROW/WSAB Corridor for Street Car or BRT service.
- Santa Ana-Garden Grove Fixed Guideway Corridor Study (2009-Present) – The City of Santa Ana is evaluating the feasibility of Street Car service connecting the Santa Ana Regional Transportation Center (SARTC), the Lacy Neighborhood, downtown Santa Ana, and the Civic Center area. Future expansion of the system from the Civic Center area would use the PEROW/WSAB ROW to extend service to Bristol Boulevard in Santa Ana as a Phase I terminus,

Figure 2.1 – Previous Studies in Corridor Study Area



and then to Harbor Boulevard in Garden Grove as a Phase II terminus. Proposed system information from this study has been reflected in this AA study.

The West Santa Ana Branch corridor was identified in the Measure R transportation sales tax program approved by Los Angeles County voters in November 2008. A future project was included in the Recommended Plan portion of Metro's *2009 Long Range Transportation Plan* (LRTP). Adopted in October 2009, Metro's 2009 LRTP was forwarded to SCAG, and a future project placeholder was included in the *2008 Regional Transportation Plan* (RTP) and is included in the draft *2012 RTP*.

2.2 Screening and Selection Process

During the AA efforts, transportation alternatives were identified and evaluated through a three-step screening process incorporating technical and environmental analysis, along with community and stakeholder input. The screening efforts were based on project goals identified based on feedback received from the public, stakeholders, and the project's Steering Committee and Technical Advisory Committee (TAC) during project initiation efforts as documented in the *PEROW/WSAB Corridor AA Evaluation Methodology Report*. In addition, the resulting goals and evaluation criteria reflected the project's Purpose and Need, as presented in the *PEROW/WSAB Corridor AA Purpose and Need Report*. The resulting major goals are presented below in the following five main categories corresponding to the federal project evaluation categories:

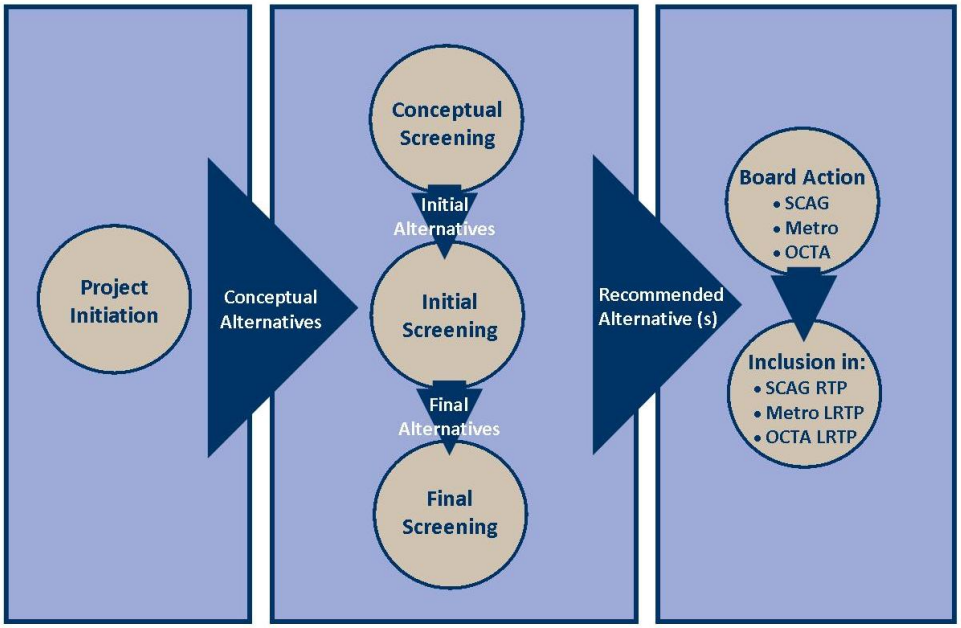
1. Public and Stakeholder Support
   - Provide a desirable solution to the community and stakeholders.
2. Mobility Improvements
   - Provide another travel option.
   - Connect to the regional transit system.
   - Serve both community and regional trips.
   - Increase access to and from Corridor destinations and activity centers.
   - Provide a fast travel speed.
   - Provide related pedestrian and bicycle facilities.
3. Cost-Effectiveness
   - Provide a cost-effective solution.
4. Land Use/Economic Plans
   - Provide station location and spacing that supports local economic development and revitalization plans and goals.
5. Environmental and Community Impacts
   - Identify a project that results in no or minimal environmental impacts to adjacent communities.

Using the project goals, a detailed set of evaluation criteria with related performance measures was developed to provide the public and decision-makers with comparative information on the benefits and impacts, as well as the differences between the alternatives. Each evaluation phase refined the results of the previous effort using increasingly detailed engineering, operational, and environmental analysis,

along with continued public input. The screening process followed the three-step process summarized below and illustrated in Figure 2.2:

1. *Conceptual Alternatives Screening* – A set of nine Conceptual Alternatives, representing a wide range of possible technologies, was identified during the project initiation process based on public and stakeholder input and previous studies. Alternatives were evaluated based on a "meets-does not meet" level of policy and technical assessment, along with stakeholder input. This effort led to the identification of eight Initial Alternatives.
2. *Initial Screening* – The Initial Alternatives were assessed based on a comparative initial evaluation of technical and environmental benefits and impacts, along with additional stakeholder and public feedback. This evaluation step resulted in the identification of the Final Alternatives which included four build options offering new transit solutions, along with the No Build and Transportation System Management (TSM) alternatives.
3. *Final Screening* – The Final Alternatives were studied and evaluated based on conceptual-level engineering and related technical and environmental information, along with stakeholder and public input, to identify a Recommended Alternative(s).

Figure 2.2 – Screening Process



The Recommended Alternative(s) will be presented to the SCAG Regional Council and Metro and OCTA Boards. The final AA recommendation may be included by SCAG action in the *2012 Regional Transportation Plan (RTP)*, and by Metro and OCTA Board actions in their respective LRTPs. As the owners of the PEROW/WSAB ROW, Metro and OCTA have the option to move the Recommended Alternative(s) forward into the preliminary engineering design and environmental review phase.

2.2.1 Conceptual Set of Alternatives

As documented in the *PEROW/WSAB Corridor AA Initial Screening Report*, Conceptual Alternatives were identified from previous studies, and in consultation with elected officials, stakeholders, city and agency staff through briefings and advisory committee meetings, and with the public through a series of six community meetings. The Conceptual Set of Alternatives included eight built options:

- BRT – Two alternatives, including Street-Running and HOV Lane-Running BRT alternatives;
- Urban Rail – Three rail options, including Street Car, LRT, and Diesel Multiple Unit (DMU) service; and
- High Speed Service – Three High Speed Service (HSS) options, including Commuter Rail Service, Conventional Steel Wheel High Speed Rail, and Magnetic Levitation High Speed Service.

During the first screening phase, the alternatives were evaluated on a "meet-does not meet" level assessment of technical viability, purpose and policy fit, and public support. The conceptual screening effort identified each option's ability to address the locally-defined goals, and the identified Purpose and Need. A comparative summary of the conceptual screening effort was prepared based on the following criteria and factors:

- Public Support – Input was solicited through a series of elected official and stakeholder briefings, Project Steering Committee and TAC meetings, and six community meetings.
- Trip Types – Each alternative's trip-serving capability was assessed based on whether it could serve both local and regional trips based on station spacing, resulting operational speeds, and Southern California experience.
- Speed – As identified by Corridor stakeholders and the public, the two criterion used to determine whether an alternative would provide improved travel speed were: the average Metro Blue Line travel speed of 25 miles per hour (mph) as the one transit line most people were familiar with; and the average peak period travel speed for the I-5 Freeway (35 mph or less) in and adjacent to the study area.
- Station Spacing – Many Corridor cities have adopted transit-supportive economic development and revitalization plans supporting for their proposed station areas. Alternatives with more frequent station spacing were seen as providing a higher level of support for local development goals than those with wider spacing required due to operational parameters.
- Service Capacity and Flexibility – Anticipated ridership levels were identified based on previous Corridor Study Area studies and compared to the passenger capacity provided by typical vehicles for each of the proposed alternatives. Cost-effective service flexibility was identified based on the ability of each of the typical vehicles to be reconfigured to serve peak and non-peak services. For example, LRT service can be scaled from a single car to a three car train to match operational needs.
- Compatibility with Current Transit Operations – Compatibility was assessed based on whether there was an existing transit service provider, with previous operational experience, that could

construct, operate, and maintain the proposed alternative, or whether a new service entity would be required with a related learning curve.

- Fit with Freight Rail Operations – Freight rail operations fit was assessed based on the alternative's ability to share the existing freight rail right-of-ways (ROWs) from terminus of PEROW/WSAB ROW north to downtown Los Angeles based on FRA rulings and requirements related to shared-operations and crash-compliant vehicles.

A comparative summary of the conceptual screening results are presented in Table 2.1. Reflecting the initial level of assessment, alternatives were identified as either meeting (yes or ✓) or not meeting (no or •) the identified goals and criteria. In some cases, insufficient information was available at this stage in the planning process, and areas that are dependent on factors, such as the final station spacing, the type of vehicle selected, and operational decisions ultimately made, were identified as requiring additional information (▫). For example, if the decision were made to operate the BRT Alternative in a dedicated ROW, it would be capable of providing faster travel service than a street-running alternative.

Table 2.1 – Summary of Conceptual Screening Results

Criteria	Conceptual Alternatives					
	BRT	STCR	LRT	DMU	CR	HSS
Community/stakeholder support and/or interest	•	✓	✓	✓	•	✓
Serves community and regional trips	✓	•	✓	✓	•	•
Provides fast travel service	▫	▫	✓	✓	✓	✓
Station spacing supports local economic development/revitalization goals	✓	✓	✓	✓	•	•
Accommodates peak and non-peak service needs	✓	✓	✓	✓	•	•
Compatible with current transit systems/plans	✓	▫	✓	•	✓	▫/•[1]
Compatible with freight rail operations	•	▫	▫	▫	✓	▫

Notes: STCR – Street Car; CR – Commuter Rail; and HSS – High Speed Service options, Conventional Steel Wheel High Speed Rail Alternative and Magnetic Levitation High Speed Service Alternative.
✓ Yes • No ▫ Dependent on station spacing, vehicle selected, and operational decisions.
[1] The first symbol (▫) represents the finding for the Conventional Steel Wheel High Speed Rail Alternative; the second symbol (•) is for the Magnetic Levitation High Speed Service Alternative.

The resulting information was presented for stakeholder and public input through a series of briefings, meetings, and work sessions. Six community meetings were held at locations throughout the study area and a summary of the outreach efforts and results is presented in Chapter 6.0, Public Input of this report. On July 14, 2010, the Project Steering Committee recommended the deletion of the Commuter Rail Alternative and further study of the remaining seven build alternatives described below.

2.2.2 Initial Set of Alternatives

The Initial Set of Alternatives included the seven build options, which provide a new transit solution, listed below. During this phase, the No Build and Transportation System Management (TSM) options were not evaluated, but the projects to be included in the No Build Alternative, and a list of possible Corridor projects to be included in the TSM Alternative, were presented for public discussion.

1. Bus Alternative
   - *BRT* – Provide high speed bus service operating in dedicated lanes along the PEROW/WSAB ROW, and connecting north to the Metro rail system in downtown Los Angeles via either freeway high occupancy vehicle (HOV) lanes or street-running operations; and connecting south from the PEROW/WSAB Corridor via street-running operations through downtown Santa Ana to the SARTC.
2. Urban Rail Alternatives
   - *Street Car* – Build a community-oriented rail system similar to that being considered by the cities of Santa Ana and Garden Grove.
   - *LRT* – Build a LRT rail system similar to the Gold and Blue Lines operated by Metro in Los Angeles County.
   - *DMU* – Build a self-powered, clean diesel DMU rail system similar to the Sprinter service operated by the North County Transit District in San Diego County.
3. High Speed Service Alternatives
   - *Conventional Steel Wheel High Speed Rail* – Implement high speed rail service similar to the service being planned by the California High Speed Rail Authority, and operated by Amtrak in the eastern U.S. and by others throughout Europe and Asia.
   - *Magnetic Levitation High Speed Service* – Provide high speed maglev service similar to systems operating in Asia.

Initial Screening Efforts and Results

The Initial Set of Alternatives was evaluated based on an initial assessment of technical and environmental benefits and impacts to identify the alternatives that best met the project goals and identified Corridor Purpose and Need, were technically viable, and had stakeholder and community support. At this level of evaluation, technical analysis was based on order-of-magnitude information identified from similar existing transit projects in Southern California and other locations as presented in Table 2.2.

Conceptual definitions of the build alternatives were developed to support this phase's analytical efforts and included: the horizontal alignment, or how each option would travel through the PEROW/WSAB Corridor; the vertical alignment, or whether the alternative would operate at-grade, above-grade, or below-grade; and conceptual station locations identified in working sessions held with the Corridor cities.

Table 2.2 – Existing Transit Systems used for Initial Screening Efforts

PEROW/WSAB ROW Corridor Initial Set of Alternatives	Local or Other Peer System
Bus Rapid Transit (BRT)	Metro Orange Line
Street Car	Portland Street Car
Light Rail Transit (LRT)	Metro Gold and Blue Lines
Diesel Multiple Unit (DMU)	NCTD Sprinter System
Conventional Steel Wheel High Speed Service	California HSR
Magnetic Levitation High Speed Service	Asian maglev systems

The Initial Set of Alternatives was assessed based on a comparative analysis of technical and environmental benefits and impacts to support informed decision-making on a final set of the most viable alternatives for further study. The resulting alternative definition information, along with technical and environmental analyses, is presented in the *PEROW/WSAB Corridor AA Initial Screening Report.* While a full set of evaluation criteria was used to assess the alternatives, Table 2.3 presents a summary of the Initial Screening results based on the following key goals and criteria that were identified by stakeholders and the public:

1. Public and Stakeholder Support
   - Provide a desirable solution to the community and stakeholders.
2. Mobility Improvements
   - Serve both community and regional trips.
   - Make transit a viable alternative – attracts and serves a high level of daily ridership.
3. Cost-Effectiveness
   - Provide a cost-effective solution – balances project costs with expected benefits; resulting construction and operating costs are balanced by strong ridership (cost-effectiveness).
4. Land Use/Economic Plans
   - Provide station spacing that supports local economic development and revitalization plans.
5. Project Feasibility
   - Fit with current local transit system operations or plans.
   - Has state and federally approved vehicles, and is operational in the U.S.
6. Environmental and Community Impacts
   - Minimize the number of properties to be acquired.
   - Result in air quality benefits.

Table 2.3 – Initial Screening Results Summary

Criteria	BRT	Street Car	LRT	DMU	HSS	
					Steel Wheel	Maglev
Serves: Local trips Regional trips	✓ ✓	✓	✓ ✓	✓ ✓	✓	✓
Provides support for local plans	*	✓	✓	*	*	*
Requires minimal property acquisition	Less than 10	Less than 10	10-25	10-25	More than 125	More than 125
Has air quality benefits	Yes	Yes	Yes	No**	Yes	Yes
Fits with local transit system plans	✓	✓	✓	No	No	No
Has State and Federally approved vehicles and U.S. operating system	✓ ✓	State no ✓	✓ ✓	✓ ✓	✓ ✓	Not yet Not yet
Range of conceptual daily ridership	19,200-32,400	26,000-39,000	26,000-57,600	26,000-57,600	2,400-4,800	2,400-4,800
Conceptual cost to build ($2010, billions)	$0.6-2.2[1]	$1.3-4.0[1]	$1.6-4.2[1]	$1.2-4.1[1]	$4.9	$5.9
Conceptual annual cost per rider	$20-50	$10-40	$10-50	$10-50	$460-920	$580-1,150

Notes: * Proven nationally and/or internationally
** Some regional benefits
[1] A range of construction costs was identified reflecting at-grade operations at the low end and grade-separated (subway) at the high end; aerial operations would fall mid-range. A single cost is provided for the HSS alternatives as Maglev operations require and Steel Wheel systems work best with grade-separated operations.

Initial Screening results were presented to and discussed through: briefings held with elected officials and stakeholders from each Corridor Study Area city; public presentations to community and stakeholder groups; six community workshops; and study advisory committee briefings, including five TAC meetings, and three Steering Committee meetings. During advisory committee meetings held in March and April of 2011, the following recommendations were developed by the TAC and approved by the Steering Committee:

1. Remove the following three alternatives from further study:
   - DMU Option; and
   - High Speed Service Alternatives, including both the Conventional Steel Wheel High Speed Rail and Magnetic Levitation High Speed Service options.
2. Add a Low Speed Magnetic Levitation Alternative to the study.

2.2.3 Final Set of Alternatives

On April 27, 2011, the following Final Alternatives were approved by the Steering Committee for further study:

1. No Build Alternative
2. Transportation System Management (TSM) Alternative
3. BRT Alternative – Street-Running and HOV Lane-Running options
4. Street Car Alternative
5. LRT Alternative
6. Low Speed Magnetic Levitation Alternative.

2.3 Definition of Final Alternatives

The Final Alternatives were studied and evaluated based on conceptual-level engineering and operating design and technical information, including capital and operating cost estimates, ridership forecast modeling information, land use and development support, environmental impact analysis, and other AA study-related evaluation efforts. The study results are documented in the following chapters and summarized in Chapter 7.0, Comparison of Alternatives. This section describes the Final Set of Alternatives in detail.

For the No Build and TSM alternatives, the following information is presented below:

- No Build Alternative – This option included identified Corridor transportation projects that have approved local, county, state, and federal funding. No Build included projects beyond the study area that will expand the regional transit system and may have benefits for Corridor travel.
- TSM Alternative – This option addressed the same mobility needs as the build alternatives by maximizing the use and effectiveness of the existing transportation system. TSM included all of the No Build Alternative projects, along with a set of lower capital cost transit and arterial system projects identified with Metro and OCTA for Los Angeles and Orange counties respectively.

For the four build alternatives, the BRT, Street Car, LRT, and Low Speed Magnetic Levitation options, the following alternative-specific information was developed and is presented below:

- Alternative Description – an overview of each proposed alternative's modal information;
- Operational Description – a conceptual description of the horizontal and vertical alignments, and station locations; and
- Design and Operational Issues – As part of this effort, the alternatives were examined to identify engineering, operational, and environmental issues to be resolved during possible future preliminary engineering and environmental review efforts.

The description of the build alternatives was divided into three alignment sections for analytical purposes and to reflect different coordination requirements and possible phasing decisions:

1. Northern Connection Area – consists of the approximately 12-mile long study area extending north from the PEROW/WSAB Corridor terminus in Paramount north to downtown Los Angeles. Possible alignments were explored to Union Station in the area from the Metro Blue Line on the west to several active and inactive railroad ROWs adjacent to the Los Angeles River on the east.
2. PEROW/WSAB Area – includes the PEROW/WSAB ROW now owned by Metro and OCTA. It is approximately 20 miles long, with 12 miles of the alignment located in Orange County, and the remaining eight miles in Los Angeles County.
3. Southern Connection Area – consists of an approximately two mile long area extending southeast from the southern PEROW/WSAB ROW terminus at Raitt Street in Santa Ana east through the city's civic center and downtown areas to the SARTC.

2.3.1 No Build Alternative

The No Build Alternative represents completion of Corridor transportation improvements which have committed local, county, state, and federal funding as identified in constrained plans of the adopted Metro and OCTA LRTPs. This option was used for comparison purposes to assess the relative benefits and impacts of constructing a new transit project in the Corridor Study Area versus implementing only currently planned projects. In addition to providing a comparative basis for the build options, the No Build Alternative was identified as a preferred alternative by some Orange County cities and community members.

Currently planned projects in the Corridor Study Area have been identified from transportation tax measure programs approved by voters in Los Angeles County (Measure R) and Orange County (Measure M2), adopted Metro and OCTA LRTPs, and the SCAG RTP and Regional Transportation Improvement Plan (RTIP). The adopted 2008 RTIP and amendments incorporate approved transportation programs and projects with committed, available, or reasonably available resources. The major approved highway and transit projects located in the study area are presented in Table 2.4 and illustrated in Figures 2.3 and 2.4. The adopted Metro 2009 LRTP includes a future West Santa Ana Branch project for the Los Angeles County section of the PEROW/WSAB ROW, and the OCTA 2010 LRTP includes the Santa Ana-Garden Grove Fixed Guideway Project utilizing a portion of the Orange County section of the ROW.

Table 2.4 – Approved Transportation Improvements in Corridor Study Area (2035)

Project Name	Project Description
Freeway Improvements	
I-5	Construction of mixed-flow and HOV lanes, reconfiguration of interchanges, and widening of bridges
I-405	Construction of mixed-flow lanes and HOV connectors, interchange improvements, and widening of bridges

Figure 2.3 – Approved Highway Projects in Corridor Study Area (2035)

Table 2.4 – Approved Transportation Improvements in Corridor Study Area (2035)

Project Name	Project Description
Freeway Improvements	
I-605	Construction of HOV connectors and improvements to interchanges.
I-710	Construction of mixed-flow and truck-only lane and improvements to interchanges.
SR-22	Construction of HOV lanes, improvements to interchanges, and lengthening of bridges.
SR-55	Construction of additional travel lanes.
SR-91	Provision of mixed flow lane.
Arterial Improvements	
Los Angeles County	$1.5 billion for various arterial projects.
Orange County	$2.0 billion for various arterial projects.
Transit Projects	
Regional Connector Transit Corridor	Downtown Los Angeles LRT connection between Union Station and 7th/Metro Center.
Santa Ana-Garden Grove Fixed Guideway	New fixed guideway project providing regional rail feeder service between the SARTC and Harbor Boulevard.
Long Beach Transit	Increase service frequency on bus routes connecting Long Beach with Orange County.

In addition to the corridor-specific projects identified above other regional transportation system projects anticipated to be implemented by 2035, the following transit, commuter rail service, and goods movement projects will expand and enhance the regional transit system and may have benefits for PEROW/WSAB Corridor travel:

1. California High Speed Rail Project (CHSR) – Palmdale to Los Angeles (Union Station) and Los Angeles to Anaheim segments;
2. Los Angeles County LRTP Projects
   - Exposition Transit Corridor, Phases 1 and 2
   - Crenshaw/LAX Transit Corridor
   - Metro Green Line to LAX
   - South Bay Metro Green Line Extension
   - Westside Subway Extension
   - BNSF Grade Separation improvements in the Gateway Cities subregion.
3. Orange County LRTP Projects
   - Anaheim Fixed Guideway Project
   - Metrolink Station and High Frequency Service Improvements
   - Development of Regional Gateways related to CHST service.

Figure 2.5 – Approved Transit System Projects (2035)

2.3.2 Transportation System Management Alternative

The Transportation System Management (TSM) Alternative addresses the same mobility needs as the build alternatives by maximizing the use and effectiveness of the existing transportation system. This alternative provides a lower capital cost set of mobility improvements, and does not include the construction of the build alternatives identified in this AA study. TSM provides a comparison to measure the resulting mobility improvements from implementing a major transit improvement compared to maximizing the use of the existing transportation system. The TSM alternative includes all of the projects included in the No Build Alternative, plus the transit and arterial system improvement projects identified for implementation by 2035 with Metro and OCTA staff presented in Table 2.5 and Figure 2.5. The TSM Alternative is presented as: a *Core Service Project* representing bus service providing a service alignment similar to the build alternatives, which includes the Union Station-Los Cerritos Center service in Los Angeles County, and the Katella Avenue BRT Service in Orange County; and a *Corridor System* option which includes the Corridor-wide TSM improvement projects presented in Table 2.5.

Table 2.5 – Transportation System Management (TSM) Alternative Projects (2035)

Project	Description
Los Angeles County	
Bus Service Improvements	
Provide new limited stop bus line serving Corridor travel	• All day weekday and weekend service • Union Station – Los Cerritos Center (transfer point between Metro and OCTA bus systems)
Extend transit signal priority system to support new bus service	31 intersections along Soto Street, Firestone Boulevard, and Lakewood Boulevard
Provide Long Beach Transit service to Green Line	• All day weekday and weekend service • Green Line Lakewood Station – Downtown Long Beach
Other Modal Improvements	
Bicycle/Pedestrian Path along WSAB ROW	Class 1 Bicycle Path (8 miles)
Orange County	
Bus Service Improvements	
Enhance OCTA BRT service with: • Transit signal priority • Queue jumpers • Real-time messaging	• Weekday service on three lines: - Westminster Boulevard – 17th Street - Bristol Street – College Boulevard - Harbor Boulevard
Provide three new OCTA BRT lines	• Weekday service on three lines: - Beach Boulevard BRT - Katella Avenue BRT - Edinger Avenue BRT
Provide express bus service on SR-22 (Long Beach Transit)	• Weekday service • South Coast Metro – Long Beach Transit Mall/Blue Line
Provide express bus service using I-405 HOV Lanes (Long Beach Transit)	• Weekday, peak period only service • South Coast Plaza – Wardlow Blue Line Station via I-405

Figure 2.5 – TSM Alternative Projects (2035)

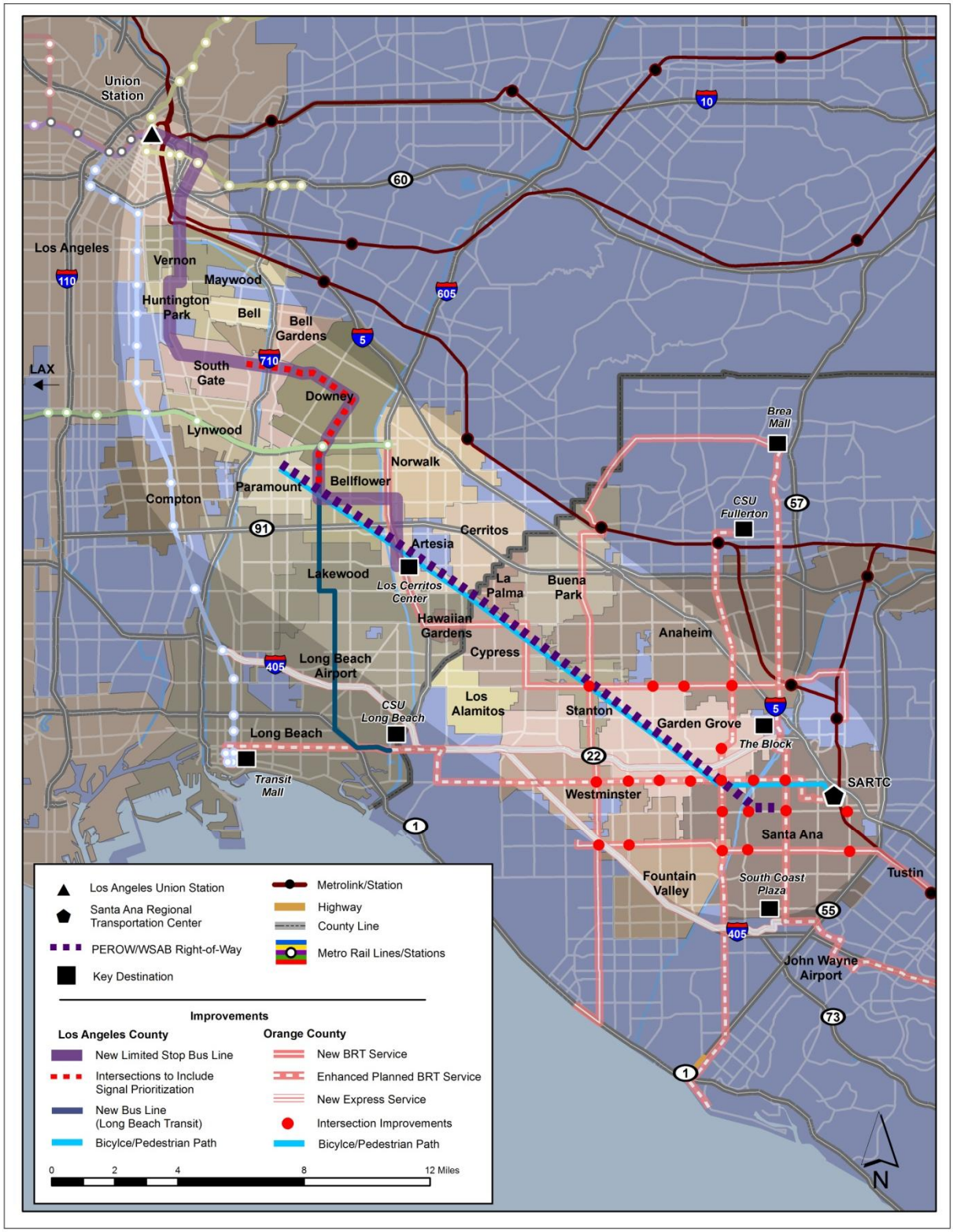


Table 2.5 – Transportation System Management (TSM) Alternative Projects (2035)

Project	Description
Orange County	
Other Modal Improvements	
Bicycle/Pedestrian Path along PEROW	Class 1 Bicycle Path (10.5 miles) from Coyote Creek Bike Path – County Line to Raitt Street
Bicycle Lanes along City Streets	Class 2 Bicycle Lanes (4.5 miles) from Raitt Street – SARTC
Highway Improvements	
Optimize arterial and intersection operations at 21 intersections along six major streets adjacent to the PEROW/WSAB Corridor that form travel corridors connecting to freeway system	Improvements along six corridors: • Katella Avenue to I-5 (four intersections) • Harbor Boulevard to SR-22 (two intersections) • Westminster Blvd. /17th Street to I-5 (two intersections) • Westminster Blvd./17th Street to SR-22 (four intersections) • 1st Street to SR-22 and I-5 (four intersections) • Edinger Avenue to I-405 and I-5 (five intersections)

2.3.3 Bus Rapid Transit Alternative

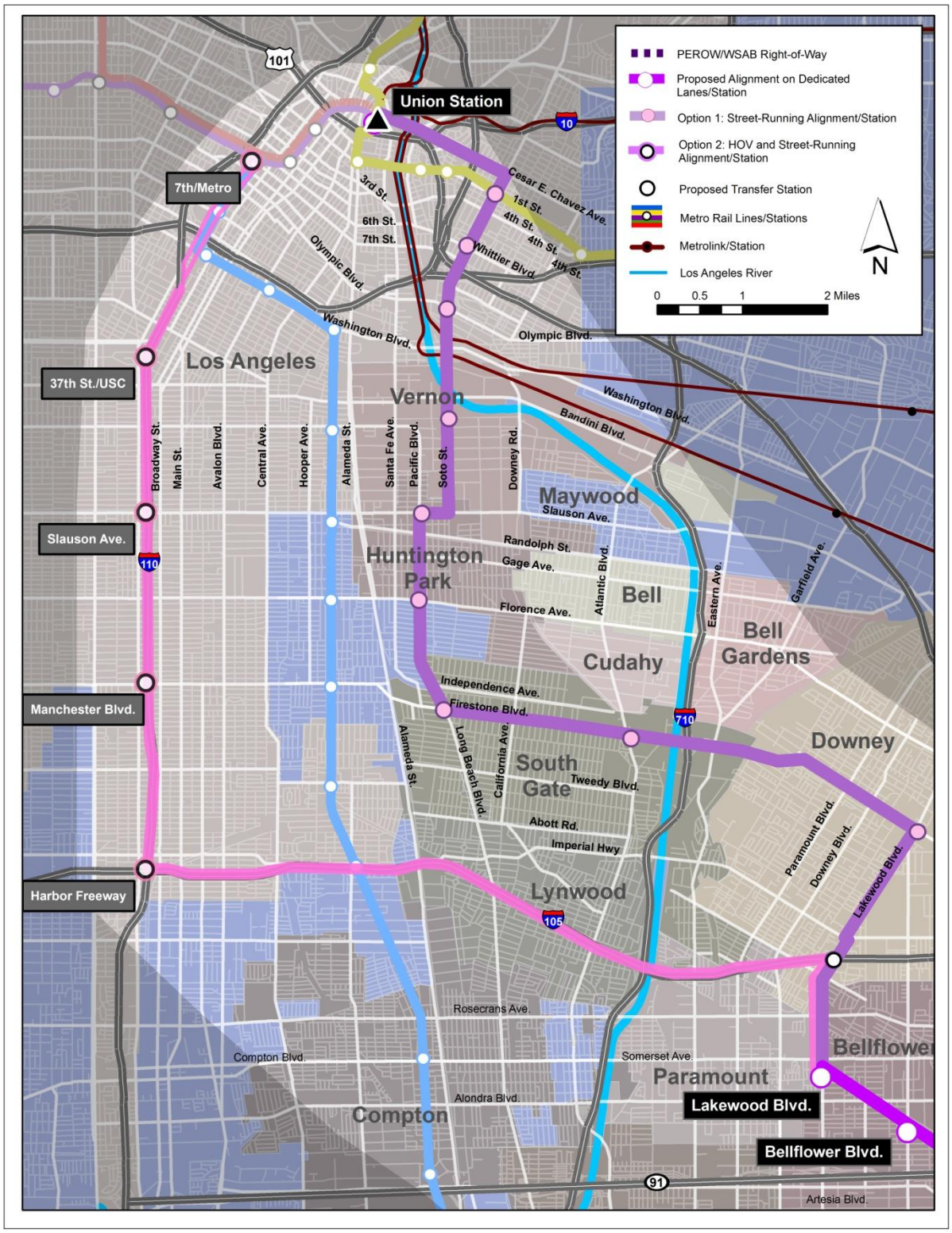
The BRT Alternative is defined as high capacity, high speed bus service running in dedicated lanes where possible similar to the Metro Orange Line operated in the San Fernando Valley portion of Los Angeles County, or with signal priority similar to the Metro Rapid service operating in Los Angeles County. Running in dedicated lanes on a former railroad ROW, the Metro BRT system has an average speed of 22 mph, with top speeds of 35 mph. The vehicles are 60-foot articulated buses with a seated capacity of 57 passengers and a total capacity of 74 riders.

Operational Description

Two Corridor BRT operational scenarios were identified and evaluated. While both options have the PEROW/WSAB ROW and the connection south through Santa Ana city streets in common, the proposed connection north from the PEROW/WSAB ROW terminus in Paramount to downtown Los Angeles differs as illustrated in Figure 2.6:

- HOV Lane-Running Option – This alternative would operate in HOV lanes along the I-105 and I-110 freeways to the current terminus of the I-110/Harbor Transitway at 23rd Street and continue in street-running operations northbound on Figueroa Street and southbound on Flower Street. Service would terminate at the 7th/Metro Center Station providing a transfer to the Metro Red, Purple, and Blue lines today, and the Gold Line in the future with completion of the Regional Connector and the Exposition Line. In addition, this option would interface with the Metro Green Line Lakewood Boulevard Station. This service would be operated in 45 foot buses similar to the Metro Silver Line.
- Street-Running Option – This limited stop service alternative with signal priority improvements would leave the PEROW/WSAB ROW to run north on Lakewood Boulevard to interface with the Metro Green Line Lakewood Boulevard Station, and then continue north in street-running route

Figure 2.6 – BRT Alternative: Northern Alignment Alternatives



along Firestone Boulevard, Long Beach Boulevard, Slauson Avenue, and Soto Street, with a stop at the Metro Gold Line Soto Street Station, and then along Cesar Chavez Avenue to Union Station. This option would provide a transfer to the Metro Red and Gold lines, the Metrolink commuter rail system, and Amtrak intercity rail service. The Street-Running Alternative would be operated in 40 foot buses similar to Metro Rapid service.

At the southern end of the PEROW/WSAB Corridor, both BRT options would leave the ROW to operate on Santa Ana city streets along one of two alternative routes illustrated in Figure 2.7:

- Harbor Boulevard/1st Street/SARTC – After leaving the Harbor Boulevard Station located on the PEROW/WSAB Corridor, where riders could transfer to the future Santa Ana Street Car system, this service alignment would travel south on Harbor Boulevard, turn east on 1st Street, and north on a realigned Santiago Street to the SARTC where passengers could transfer to Street Car, Metrolink, and Amtrak services, along with OCTA and international bus services.
- Westminster Boulevard/17th Street/Main Street – After leaving the Harbor Boulevard Station located on the PEROW/WSAB Corridor, this service alignment would travel east on Westminster Boulevard/17th Street, south on Main Street to interface with the future street car system, and continue to the SARTC via Santa Ana Boulevard.

Vertical Configuration

Both BRT alternatives were proposed to operate at-grade in all corridor segments. While grade-separation is possible, BRT service is typically implemented at-grade to provide a less costly, more quickly implemented transit system alternative. The Metro Orange Line was built at-grade with the system expansion currently under construction incorporating some grade-separated sections to facilitate interface with the Metrolink system at Chatsworth Station and reduce traffic impacts. Future possible engineering and environmental efforts may identify the need for grade-separated sections to improve system operations and minimize traffic and other impacts.

Service Configurations

The BRT alternatives would operate in three service configurations as illustrated in Figure 2.8:

- *Dedicated lanes* located generally in the center of the PEROW/WSAB ROW between Paramount in Los Angeles County and Santa Ana in Orange County;
- *Street-running operations* located curbside, as illustrated in Figure 2.8, with signal priority connecting north from the PEROW/WSAB ROW terminus to Union Station, south from the ROW terminus in Santa Ana, and through the civic center and downtown areas to the SARTC; and
- *Freeway HOV lane operations* connecting north from the PEROW/WSAB ROW terminus with service operating in the HOV lanes located in the I-105 and I-110 Freeways.

Figure 2.7 – BRT Alternative: Southern Alignment Alternatives

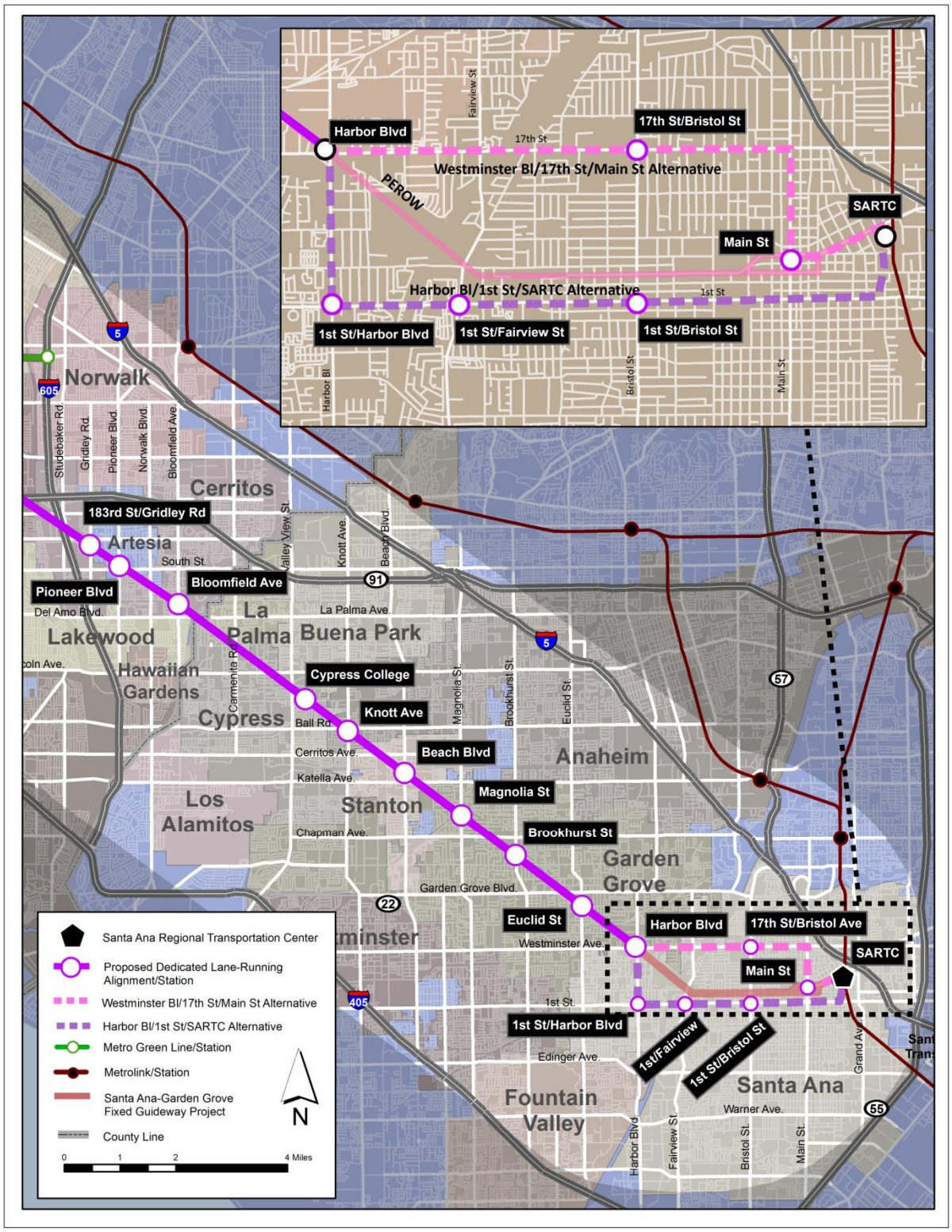
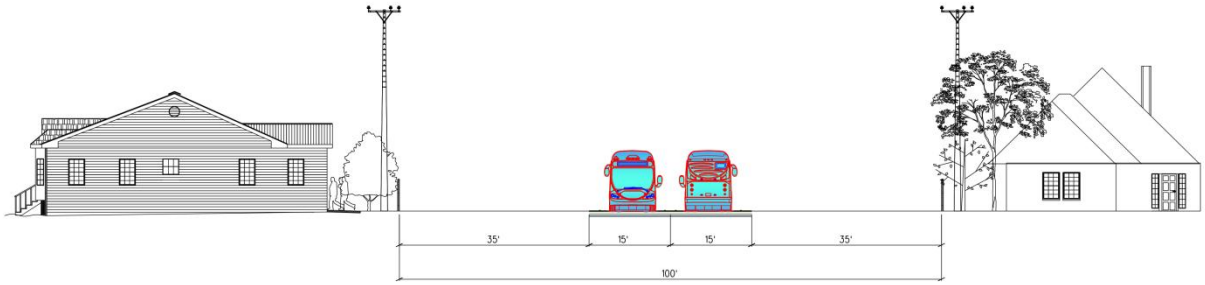
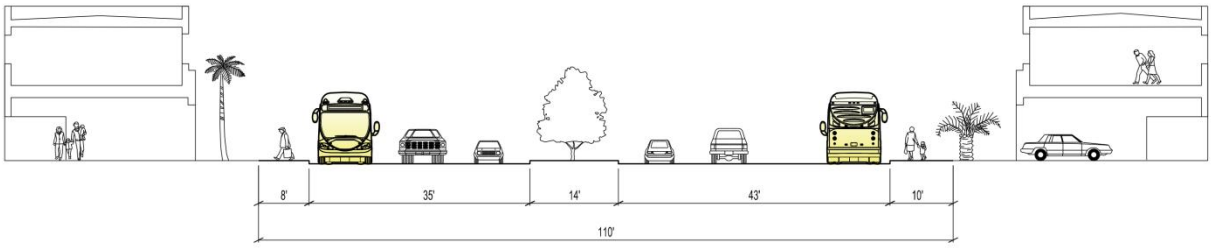


Figure 2.8 – Typical BRT Operational Cross-Sections

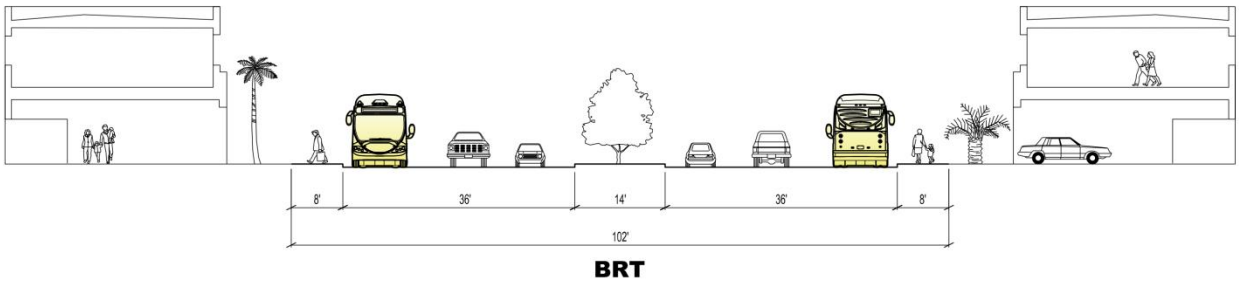
PEROW/WSAB Corridor



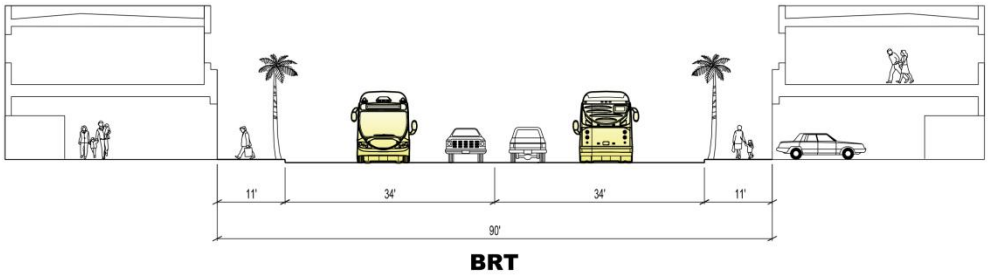
Harbor Boulevard



Westminster Boulevard/17th Street



Main Street



Stations

The proposed BRT stations are presented in Table 2.6 and described in the *PEROW/WSAB Corridor AA Station Concepts Report*. Stations were identified through the following efforts: 1) working sessions with the affected study area cities; and 2) initial discussions with Metro and OCTA service planning staff. The proposed stations were located to interface with other Corridor transportation services and serve existing activity centers and future development and economic strategy plans. The BRT HOV Lane-Running Alternative has a total of 22 proposed stations, while the Street-Running Alternative has 27 stations with five more stations in the Northern Connection Area. In this section, the Street-Running Alternative initiates service from Union Station and has six stations along Soto Street and Long Beach Boulevard, and two on Firestone Boulevard before interfacing with the Metro Green Line Lakewood Boulevard Station. The HOV Lane-Running Alternative begins service at the 7th/Metro Center Station and serves the four existing Harbor Transitway stations and Green Line Lakewood Boulevard Station.

Table 2.6 – BRT Alternatives: Proposed Stations

Street-Running Alternative		HOV Lane-Running Alternative	
Northern Connection Area			
City	Station	City	Station
Los Angeles	Union Station	Los Angeles	7th/Metro Center
	Metro Gold Line Soto Station		
	Soto St./Whittier Blvd.		
	Soto St./Olympic Blvd.		
Vernon	Soto St./Vernon Ave.		**Harbor Transitway Stations**
Huntington Park	Pacific Blvd./Slauson Ave.		37th St./USC
	Pacific Blvd./Florence Ave.		Slauson/Harbor Freeway
South Gate	Long Beach/Firestone Blvds.		Manchester
	Firestone/Atlantic Blvds.		Harbor Freeway
Downey	Firestone /Lakewood Blvd.	Downey	
	Green Line Lakewood Station		Green Line Lakewood Station
PEROW/WSAB Corridor (common to both alternatives)			
Bellflower	Lakewood Blvd.	Bellflower	Lakewood Blvd.
	Bellflower Blvd.		Bellflower Blvd.
Cerritos	183rd St. /Gridley Rd.	Cerritos	183rd St. /Gridley Rd.
Artesia	Pioneer Blvd.	Artesia	Pioneer Blvd.
Cerritos	Bloomfield Ave.	Cerritos	Bloomfield Ave.
Cypress	Cypress College	Cypress	Cypress College
Anaheim	Knott Ave.	Anaheim	Knott Ave.
Stanton	Beach Blvd.	Stanton	Beach Blvd.
Garden Grove	Magnolia St.	Garden Grove	Magnolia St.
	Brookhurst St.		Brookhurst St.
	Euclid St.		Euclid St.
Garden Grove/ Santa Ana	Harbor Blvd.	Garden Grove/ Santa Ana	Harbor Blvd.

Table 2.6 – BRT Alternatives: Proposed Stations

Southern Connection Area (common to both alternatives)			
Harbor Boulevard/1st Street/SARTC			
Santa Ana	Harbor Blvd./1st St.	Santa Ana	Harbor Blvd./1st St.
	1st St. /Fairview St.		1st St. /Fairview St.
	1st St. /Bristol St.		1st St. /Bristol St.
	SARTC		SARTC
Westminster/17th Street/Main Street/SARTC			
Santa Ana	17th St./Bristol St.	Santa Ana	17th St./Bristol St.
	Main St./Civic Center Dr.		Main St./Civic Center Dr.
	SARTC		SARTC

Station Parking

Based on initial work sessions with the Corridor cities, existing and proposed BRT station parking opportunities were identified and are presented in Table 2.7. Several cities viewed this alternative as upgraded bus service and did not see the need to provide parking. It should be noted that for the Metro Orange Line, parking is provided at five of the 13 BRT-only stations with the number of spaces ranging from 270 to 1,205 reflecting the station's role and adjacent land uses. Any future planning and design efforts would include more detailed parking demand analysis and work sessions with Corridor cities to identify the optimal location and number of parking spaces.

Table 2.7 – BRT Alternatives: Proposed Station Parking

City	Station	Alternative	Notes
Los Angeles	Union Station	Street	Existing surface and structured parking; no new parking proposed.
	Slauson/Harbor Transitway	HOV	Existing 160 surface spaces.
	Manchester/Harbor Transitway	HOV	Existing 127surface spaces.
	Harbor Freeway	HOV	Existing 253 surface spaces.
Downey	Green Line Lakewood Boulevard	HOV	Existing 545 surface spaces; spill-over parking in adjacent residential neighborhoods.
Cypress	Cypress College	Both	Proposed future station area parking structure for college and station parking.
Stanton	Beach Boulevard	Both	Proposed as part of future station area development plans.
Santa Ana	Harbor Boulevard	Both	Future Street Car Station with surface parking. Additional parking required for this project.
	SARTC	Both	Existing surface and structured parking. Master plan prepared for future Street Car station and parking. Additional parking required for this project.

Notes: Street – BRT Street-Running Alternative; HOV – BRT HOV Lane-Running Alternative; Both – station serves both BRT alternatives.

2.3.4 Guideway Alternatives

Three of the build alternatives would operate on a guideway either a steel rail or a concrete guideway:

- Street Car Alternative – This alternative reflects building a community-oriented rail system similar to that being considered by Santa Ana and Garden, and in operation in Portland and other U.S. cities. Street car systems are electrically-powered through an overhead electrical catenary system supported by traction power substations. Currently, the Santa Ana-Garden Grove Street Car system plans on using the Siemens S70 Street Car as the Portland Street Car is not approved for operation by the California Public Utilities Commission (CPUC). The selected vehicle is 79 feet in length and has 60 seats plus standee room. While the Portland Street car vehicles have a typical operating speed of 8.5 to 15 mph in mixed flow conditions, with a maximum speed of 40 mph in a dedicated ROW, the proposed Orange County Street Car vehicle can operate at up to 55 mph in a dedicated ROW.
- Light Rail Transit (LRT) Alternative – The LRT Alternative would be similar to the Metro Gold and Blue Lines currently operated by Metro in Los Angeles County. While primarily designed to operate at-grade, LRT service can be built in aerial and underground configurations where necessary, and are electrically-powered through an overhead electrical catenary system supported by traction power substations. Metro's at-grade LRT systems operate in either a street-running configuration, where the trains operate along with vehicular traffic and are controlled by the same traffic controls, or in a dedicated right-of-way where trains can operate at speeds of up to 55 mph. LRT systems Metro LRT vehicles are 90 feet in length, and operated in consists of two to three vehicles with a peak period three-car train seated capacity of 228 passengers and a total capacity of 400 riders.
- Low Speed Magnetic Levitation (Maglev) Alternative – This option would be similar to the Linimo System operating in Nagoya, Japan. System and operational needs require low speed maglev service to be run in a grade-separated configuration. Low speed maglev systems are electrically-powered through system of magnets that suspend and guide the vehicles and a linear induction motor for propulsion supported by traction power substations. The Linimo System has a maximum speed of 62 mph, with the current 5.6-mile, nine station system operating at an average speed of 22.4 mph. The vehicles are designed as an integrated three car train approximately 135 feet long with a seated capacity of 104 riders and total capacity of 248.

Operational Description

All three guideway alternatives have the PEROW/WSAB Area and the Northern Connection Area alignment options in common as illustrated in Figure 2.9, while there are variations in the Southern Connection Area that are discussed below. The operational challenges and differences between the alignments are presented in more detail in Section 2.3.5. For the Northern Connection Area, a wide range of alignment alternatives was identified and reviewed with Metro, LADOT, and the affected Corridor cities to identify the following four alignments for conceptual-level engineering and evaluation.

All four alternatives would use the San Pedro Subdivision, now owned by the Ports of Long Beach and Los Angeles, to connect north from the PEROW/WSAB ROW terminus in Paramount to Union Station. Initial conversations with the ports identified an interest in selling the San Pedro Subdivision ROW for continued transportation use by another public entity. Utilization of this railroad ROW would require provision of freight trackage, along with any new transit system, to accommodate service to the remaining customers and provide emergency travel for Alameda Corridor freight activity.

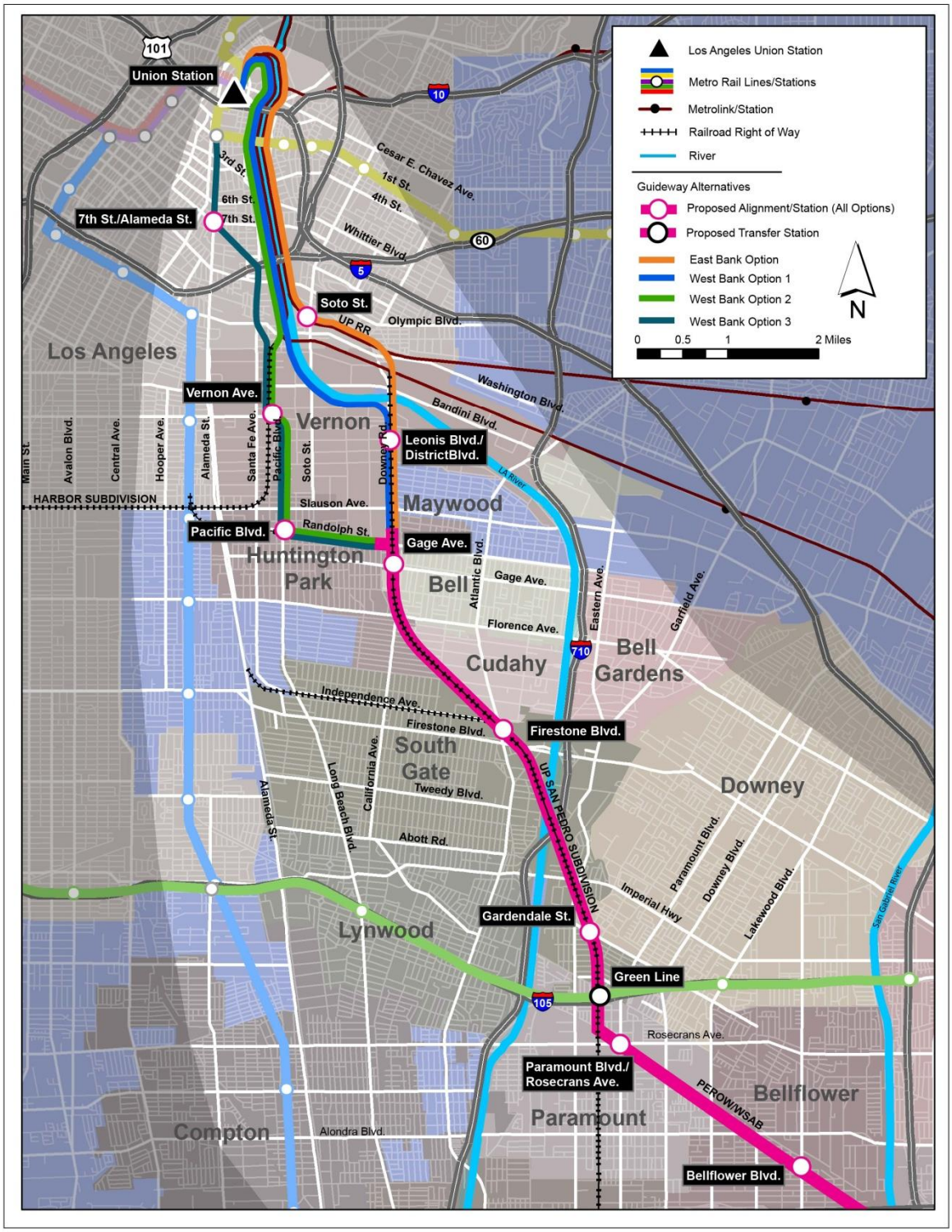
There are two sets of options for the connection north from the PEROW/WSAB ROW to Union Station, either operating along the east or west bank of the Los Angeles River as illustrated in Figure 2.9:

- East Bank Alternative – This alignment alternative would operate north along the San Pedro Subdivision to travel over a Burlington Northern-Santa Fe (BNSF) at-grade crossing and a corner of BNSF's Hobart Intermodal Yard to where the ROW intersects with the Union Pacific (UP)-owned ROW used for freight, Metrolink, and Amtrak operations. It would share the UP ROW for a short distance to where the ROW, now owned by Metro and operated by Metrolink, turns north to run along the east bank of the Los Angeles River, and cross the river into Union Station.
- West Bank Alternative – This alignment alternative would operate north along the San Pedro Subdivision to either operate along the west bank of the river north along the Metro-owned and Metrolink-operated ROW to reach Union Station, or turn west to operate along the former railroad ROW in the median of Randolph Street and operate north along several street and railroad ROW options to Union Station.

Both alternatives initially had sub-options with minor alignment variations. Based on agency input and engineering constraints, the East Bank Alternative was reduced to one option, while the West Bank Alternative had three viable options identified for further study:

- West Bank 1 – Under this alignment alternative, the connection to Union Station would operate in its own ROW along the west bank of the Los Angeles River to just beyond the Redondo Junction where it would share the Metro-owned and Metrolink-operated ROW with Metrolink and Amtrak service.
- West Bank 2 – This alignment alternative would turn west to operate in the median of Randolph Street, formerly a BNSF railroad ROW now owned by UP, through Huntington Park and then turn north to operate in the median of Pacific Boulevard, a former street car ROW until it intersects with the Metro-owned Harbor Subdivision. It would follow the Harbor Subdivision ROW in a bridge over the Redondo Junction, and then operate north along the west bank similar to West Bank option 1 to reach Union Station.
- West Bank 3 – This alternative follows the same alignment as West Bank 2, but rather than turning to operate along the west bank of the Los Angeles River, it continues north along the Harbor Subdivision, and then under city streets and private property in a combination of aerial and underground configurations to daylight south of Metro Gold Line Eastside Little Tokyo Station where it utilizes the existing at-grade Metro Gold Line tracks to reach Union Station.

Figure 2.9 – Guideway Alternatives: Northern Connection Area Alignment Alternatives



For the Southern Connection Area, two alignment alternatives were identified in working sessions with Santa Ana and OCTA staff. Consideration was given to the engineering and operational fit with future Street Car system plans. At the city's request, the PEROW/WSAB Corridor project would leave the former PE ROW at Harbor Boulevard to operate on Santa Ana city streets along one of the two alternative routes illustrated in Figure 2.10. The Low Speed Maglev Alternative would have a terminal station at the Harbor Boulevard Street Car Station where passengers would transfer to the Street Car system to travel to downtown Santa Ana and the SARTC.

The Street Car and LRT alternatives would operate on one of two alignment options:

- Harbor Boulevard/1st Street/SARTC – After leaving the Harbor Boulevard Station located on the former PE ROW, this option travels south on Harbor Boulevard, turns east on 1st Street, and then runs north on a realigned Santiago Street to a terminus at the SARTC where passengers would transfer to Street Car, Metrolink, and Amtrak services, and OCTA and international bus services.
- Westminster Boulevard/17th Street/Main Street – After the Harbor Boulevard Station, this alignment would travel east on Westminster Boulevard/17th Street, south on Main Street, where the route would turn south to interface with the future Street Car Main Street Station. Street Car and LRT passengers would transfer to the Santa Ana Street Car system to reach the SARTC.

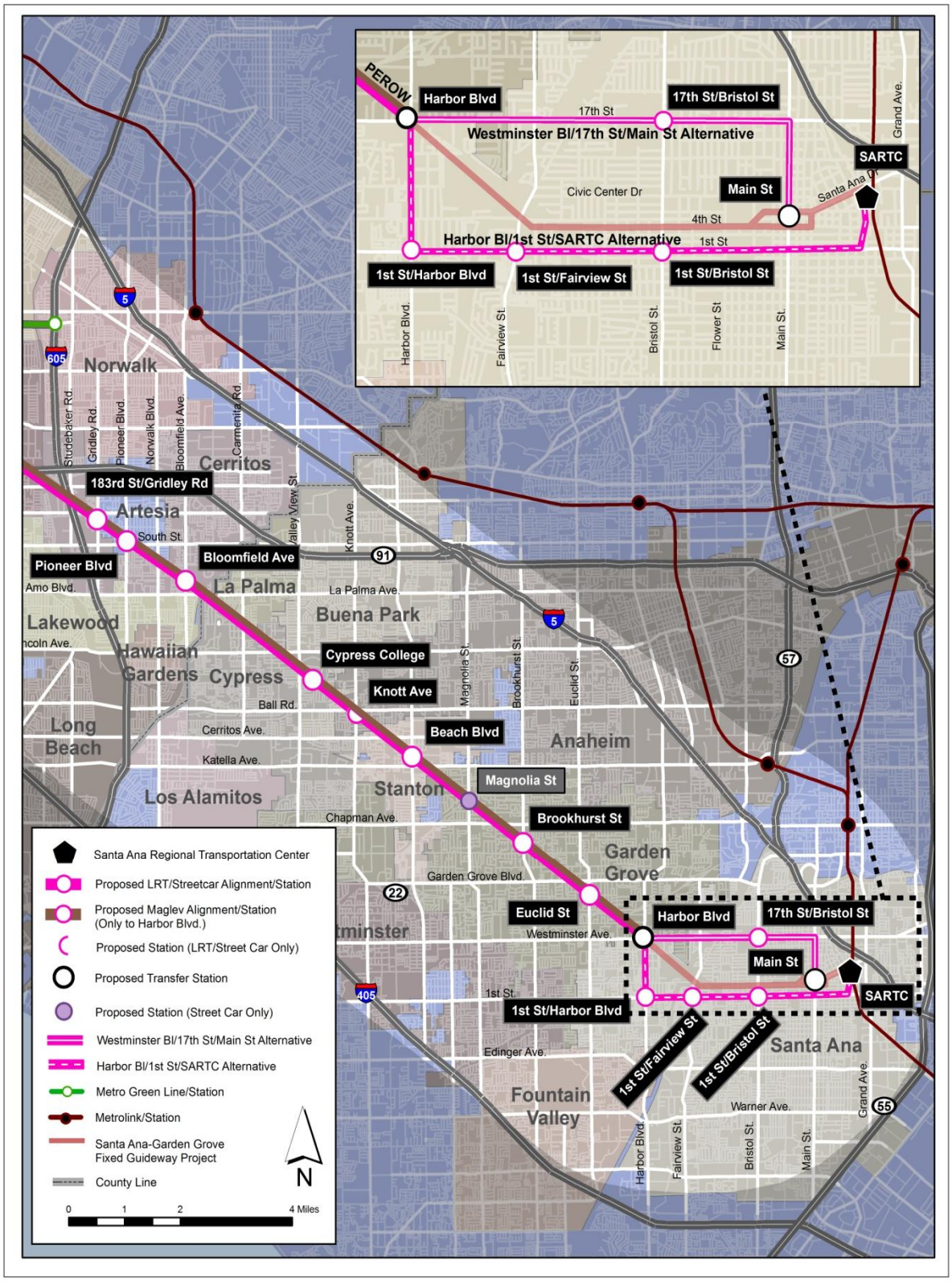
Vertical Configurations

Typical cross-sections for the three guideway alternatives are illustrated in Figures 2.11, 2.12, and 2.13. The Low Speed Maglev Alternative was designed and evaluated as a totally grade-separated system due to operational requirements, while the Street Car and LRT options were evaluated in two vertical configurations, as shown in Figures 2.14, 2.15, and 2.16:

- Combination of at-grade and grade-separated operations based on Corridor fit and physical requirements, engineering best practices, and the Metro *Grade Crossing Policy for Light Rail Transit*; and
- Entirely grade-separated operating in either an aerial or underground configuration.

This was done to bracket benefits, impacts, costs, travel times, and resulting ridership to understand the trade-offs between the two possible vertical configurations. During any subsequent preliminary engineering and environmental review efforts, the decision on whether to grade separate LRT, and possibly Street Car, service in Los Angeles County would be guided by Metro's *Grade Crossing Policy for LRT*, which provides a structured process for making grade-separated versus at-grade operation decisions. During Initial Screening, consideration of building the system entirely in a subway configuration was deleted from further consideration due to two main factors: significant capital cost and the Corridor's high water table which ranges from approximately two to 20 feet below surface, resulting in costly construction impacts, as well as concerns about dealing with contaminated water from years of railroad operations along the ROW. The significant subway construction costs were identified as not being cost-effective given the projected ridership.

Figure 2.10 – Guideway Alternatives: Southern Connection Area Alignment Alternatives



Service Configurations

The guideway alternatives would operate in four service alignments:

- *Dedicated ROW* along the PEROW/WSAB ROW between the City of Paramount in Los Angeles County and the City of Santa Ana in Orange County;
- *Railroad ROW-running operations* connecting north from the PEROW/WSAB ROW terminus utilizing several active and inactive railroad ROWs along either the eastern or western side of the Los Angeles River, the Metro-owned Harbor Subdivision, or the median of Randolph Street;
- *Street-running operations* connecting north along Pacific Boulevard, or south from the Corridor ROW terminus to either interface with the future Street Car Project, or operate along the streets in either at-grade or aerial operations through the Santa Ana civic center and downtown area to the SARTC; and,
- *Underground operations* under city streets and public and private property in the Northern Connection Area generally from the Harbor Subdivision north to the existing Metro Gold Line Little Tokyo Station.

Stations

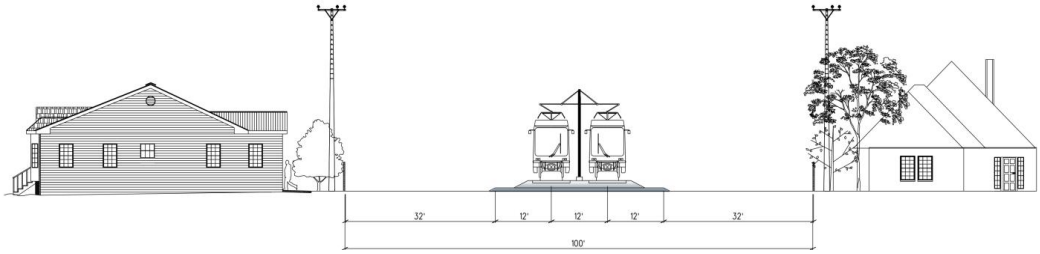
The proposed stations for the guideway alternatives are summarized in Table 2.8, presented in Table 2.9, and described in the *PEROW/WSAB Corridor AA Station Concepts Report*. Stations locations were identified through the following efforts: 1) working sessions with the affected study area cities and agencies; and 2) initial discussions with Metro Planning and Rail Operations staff regarding the northern connection alignment options for the guideway alternatives; and 3) discussions with Santa Ana-Garden Grove Fixed Guideway project staff. The stations were located to interface with other Corridor transportation services and serve existing activity centers and future development and economic strategy plans. Future station area land use planning and operational analysis may refine the Guideway station recommendations.

All of the three guideway alternatives would have similar stations with three exceptions:

- The Street Car Alternative has two more stations in the PEROW/WSAB Area than the other options. Stations were added at city request at Knott Avenue in Anaheim and Magnolia Street in Garden Grove.
- The LRT Alternative has one more station than the Low Speed Maglev Alternative as a station was added at city request at Knott Avenue in Anaheim.
- The Low Speed Maglev Alternative operates from Union Station to the proposed Harbor Boulevard station where passengers would transfer to the future Santa Ana-Garden Grove Street Car system; this alternative has no stations in the City of Santa Ana.

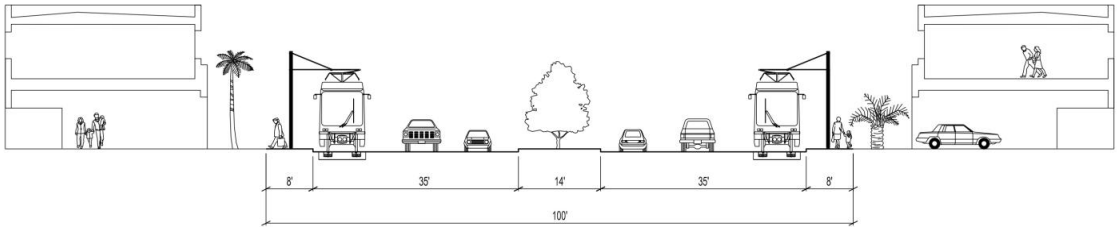
In the Northern Connection Area, the station locations vary based on the four alignment alternatives with all of the options initiating service from Union Station, and having a new Metro Green Line station located to provide a transfer to the Metro Green Line from the proposed operation along the San Pedro

Figure 2.11 – Typical Street Car Operational Cross-Sections
PEROW/WSAB Corridor



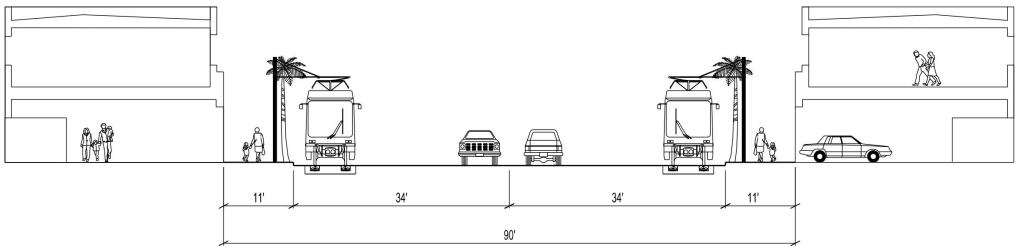
Street Car – At-Grade Center-Running

1st Street



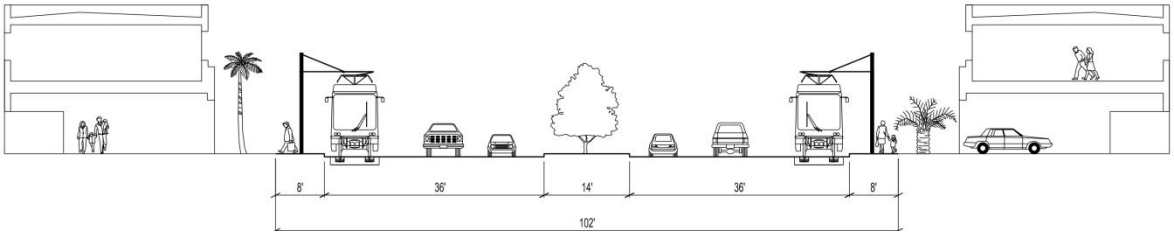
Street Car – At-Grade Curb-Running

Main Street



Street Car – At-Grade Curb-Running

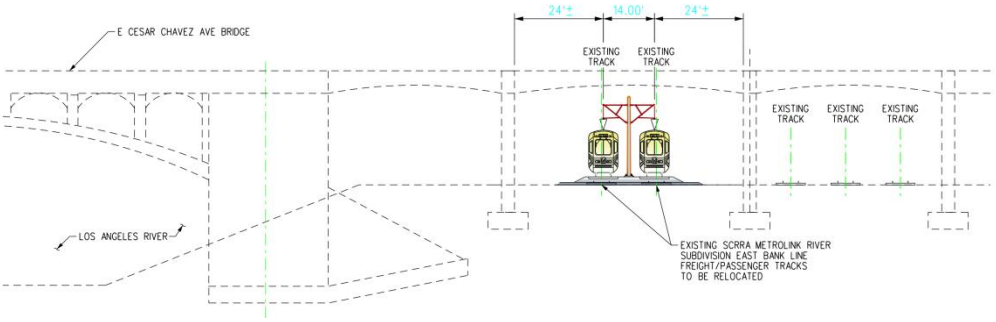
Westminster Avenue/17th Street



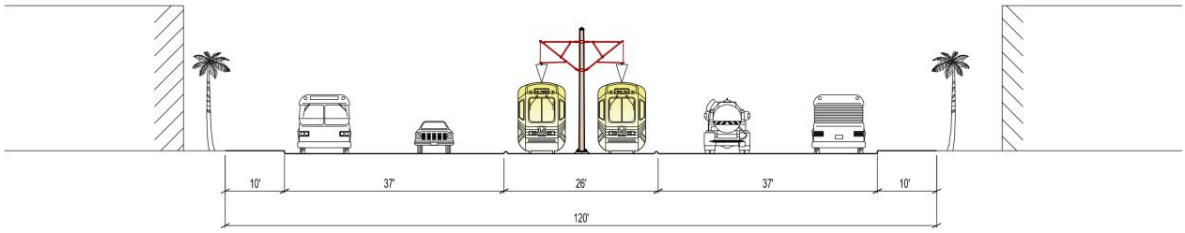
Street Car – At-Grade Curb-Runing

Figure 2.12 – Typical LRT Operational Cross-Sections

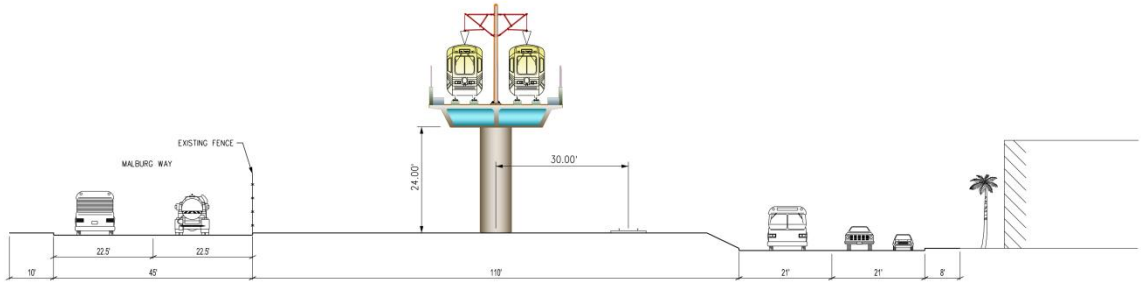
Cesar Chavez Avenue Bridge



Pacific Boulevard



Randolph Street



PEROW/WSAB Corridor

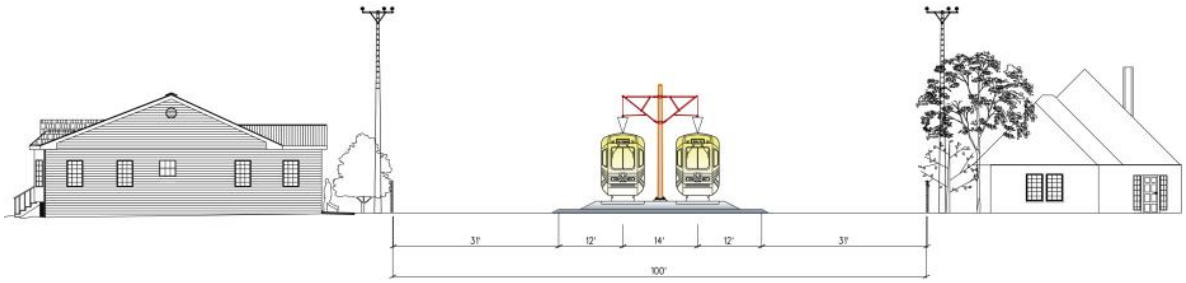
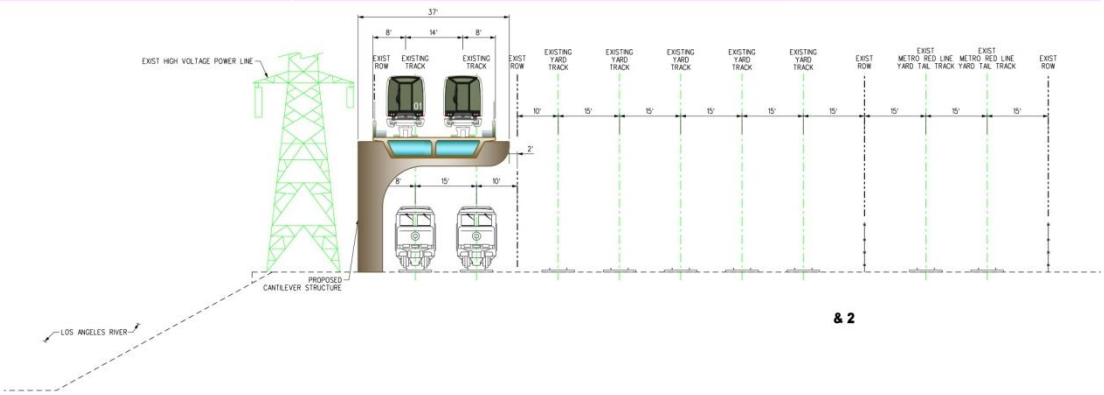
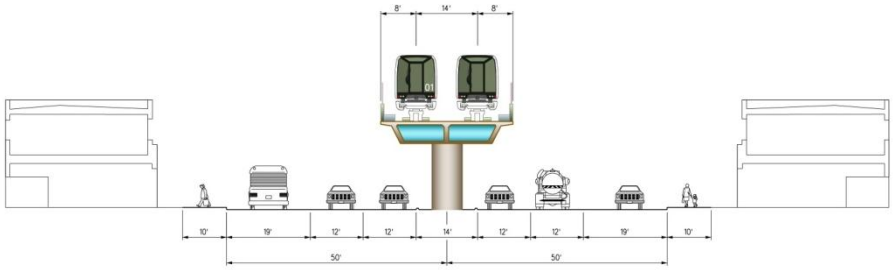


Figure 2.13 – Typical Low Speed Maglev Operational Cross-Sections

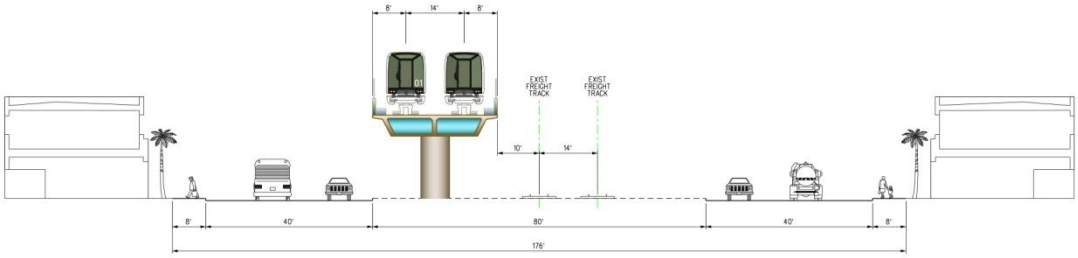
Los Angeles River



Pacific Boulevard



Salt Lake Avenue



PEROW/WSAB Corridor

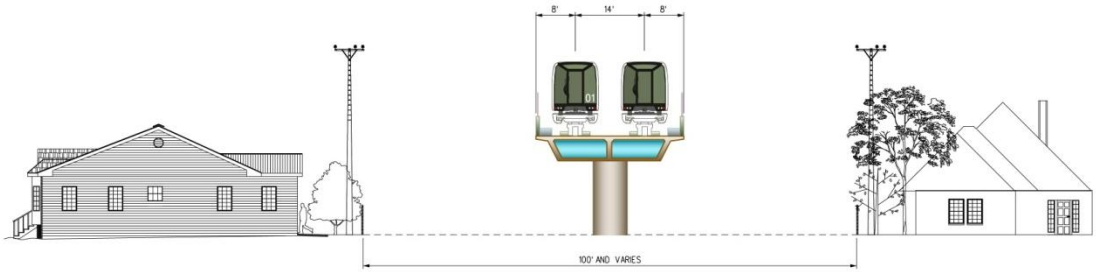


Figure 2.14 – Vertical Configurations – North of the PEROW/WSAB Corridor

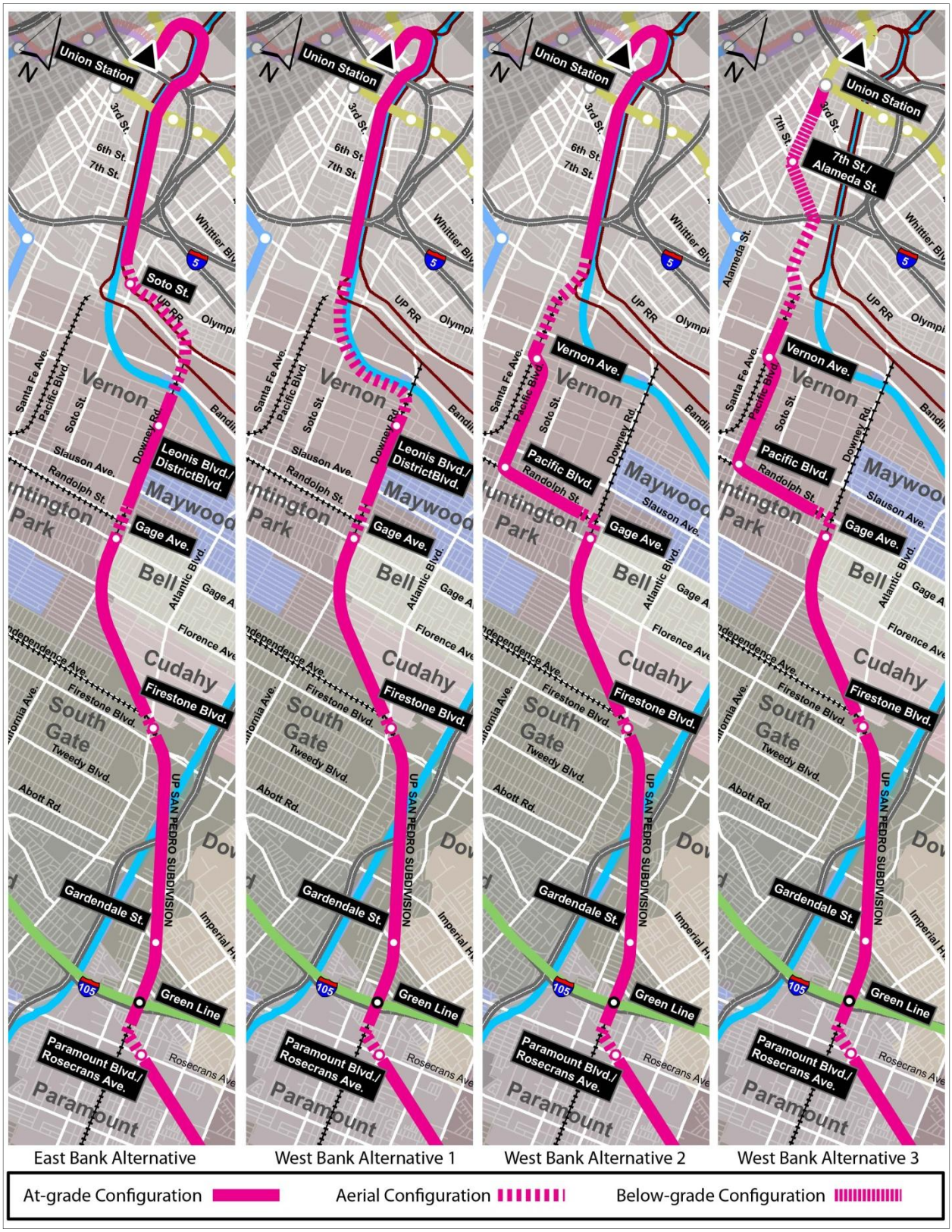


Figure 2.15 – Vertical Configurations on the PEROW/WSAB Corridor

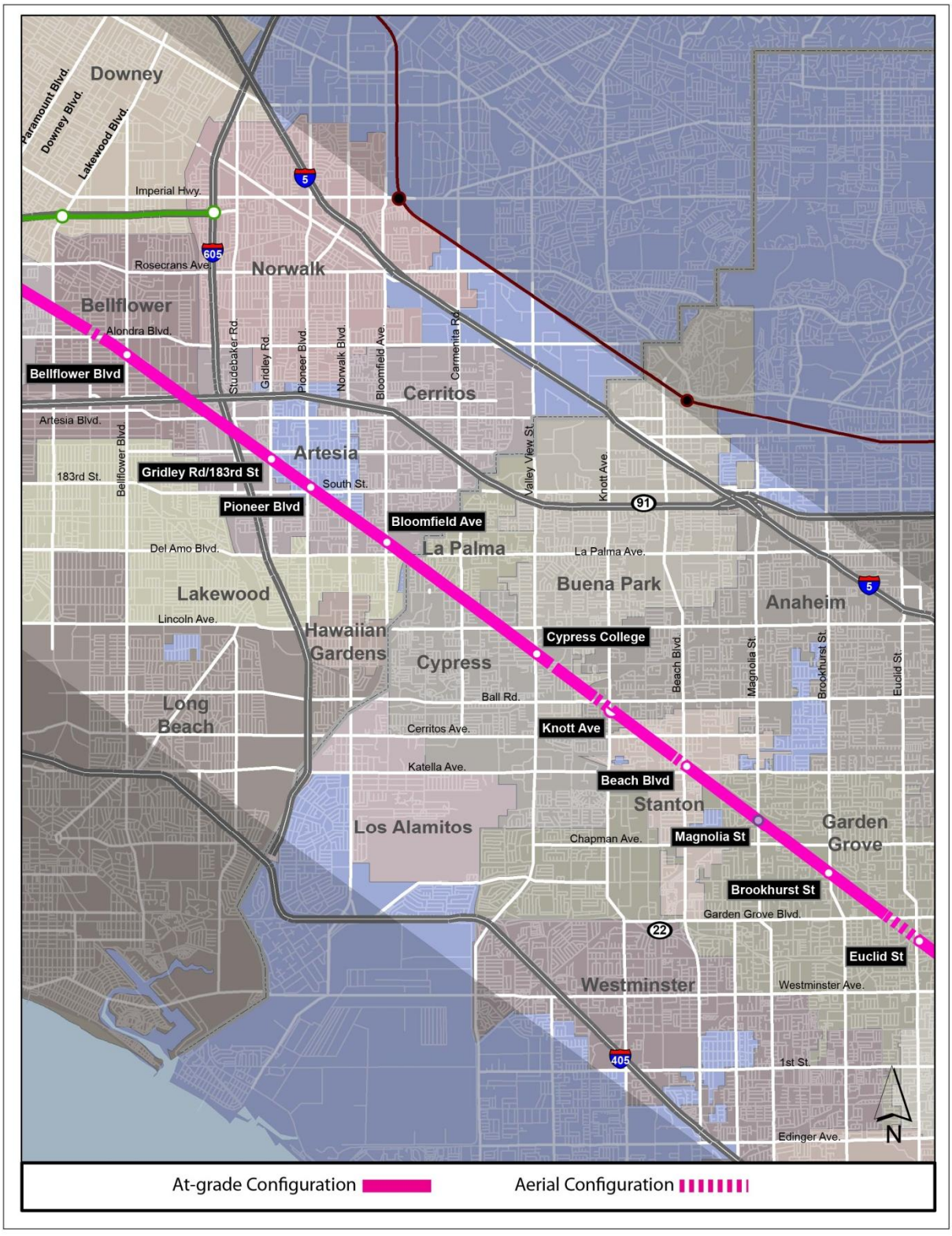
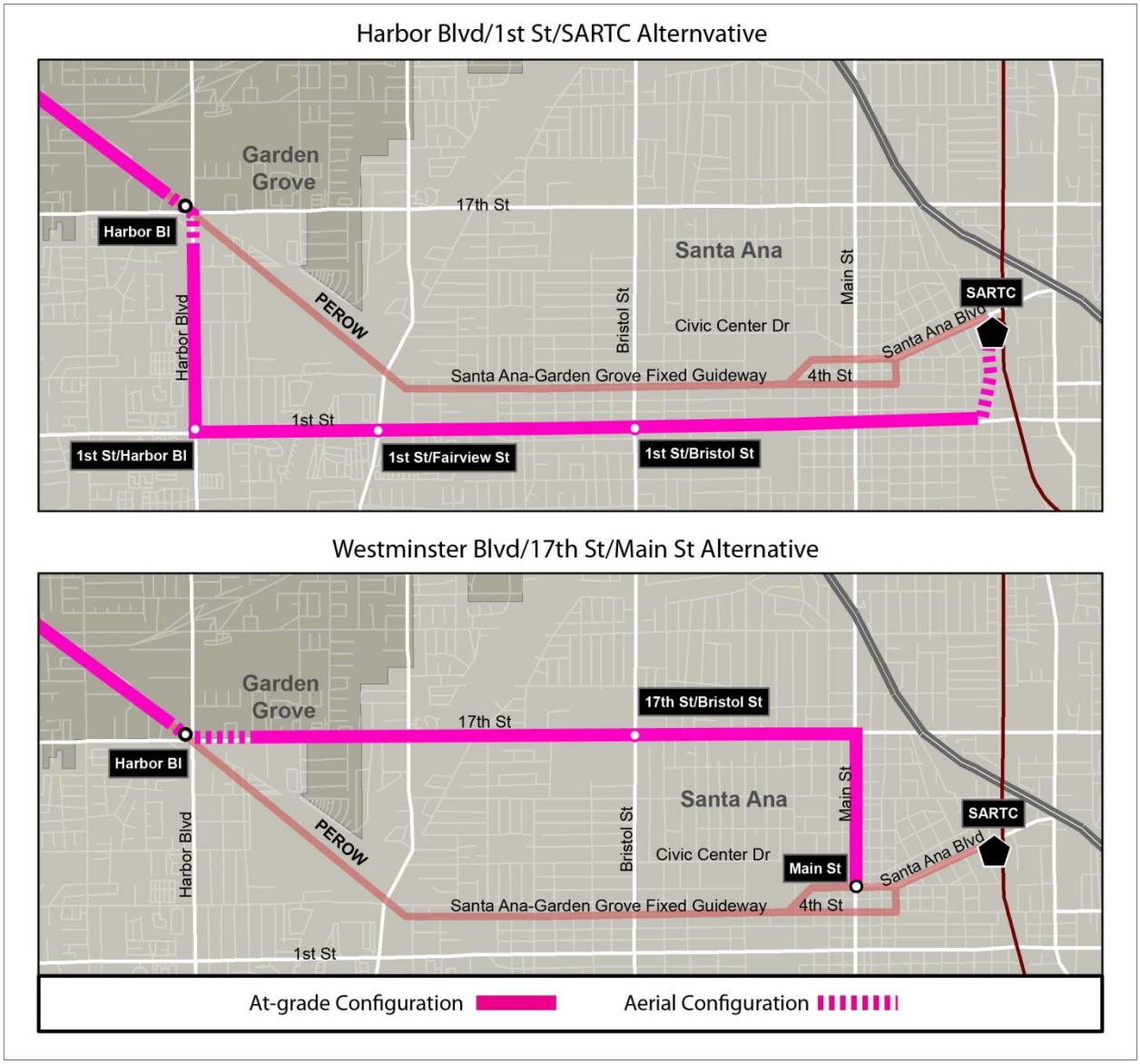


Figure 2.16 – Vertical Configurations South of the PEROW/WSAB Corridor



Subdivision ROW and with three stations in common along the ROW serving Huntington Park, South Gate, and Downey. The East Bank Alternative has two additional stations, with one serving the eastern jobs-rich portion of Vernon and the adjacent residential neighborhoods in Maywood, and a second serving East Los Angeles on Soto Street south of Olympic Boulevard. West Bank Alternative 1, running along the west bank of the Los Angeles River, has one additional station serving the same eastern portion of Vernon. West Bank Alternatives 2 and 3 turn west to operate in the median of Randolph Street through Huntington Park, and then north along Pacific Boulevard, providing a Pacific Boulevard Station serving the northern edge of the vibrant Pacific Boulevard commercial corridor, and a Vernon Avenue Station located one block from Vernon's civic center area. West Bank Alternative 3 is the only

option providing an 7th Street/Alameda Street Station serving the evolving Central City East arts community, and also may provide a Little Tokyo station.

Table 2.8 – Guideway Alternatives: Number of Stations

Area/Alignment Alternative	Street Car	Light Rail Transit	Low Speed Maglev
Northern Connection Area			
East Bank	6	6	6
West Bank 1	5	5	5
West Bank 2	6	6	6
West Bank 3	7	7	7
PEROW/WSAB Area	13	12	11
Southern Connection Area	4	4	0
Total			
East Bank	23	22	17
West Bank 1	22	21	16
West Bank 2	23	22	17
West Bank 3	24	23	18

As summarized in Table 2.8, the number of stations for the Street Car Alternative ranges from 22 to 24, for the LRT Alternative from 21 to 23, and for the Low Speed Maglev Alternative from 16 to 18. While having the shortest alignment length, the West Bank 3 Alignment Alternative has the highest number of stations reflecting additional stops in Huntington Park serving Pacific Boulevard and in downtown Los Angeles serving the Central City East area. The West Bank 1 Alignment Alternative due to serving fewer cities; it provides no stations between Leonis/District in eastern Vernon and Union Station, while the East Bank Alignment has an East Los Angeles station and the West Bank 2 Alignment provides an additional Huntington Park station at Pacific Boulevard.

Table 2.9 – Guideway Alternatives: Proposed Stations

City	Station	East Bank Alternative			West Bank Alternative 1			West Bank Alternative 2			West Bank Alternative 3		
		SC	LRT	MLV	SC	LRT	MLV	SC	LRT	MLV	SC	LRT	MLV
Northern Connection Area													
Los Angeles	Union Station	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Soto St.	✓	✓	✓									
	7th St./Alameda St.										✓	✓	✓
Vernon	Leonis/District Blvds.	✓	✓	✓	✓	✓	✓						
	Vernon Ave.							✓	✓	✓	✓	✓	✓
Huntington Park	Pacific Blvd.							✓	✓	✓	✓	✓	✓
	Gage Ave.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
South Gate	Firestone Blvd.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Downey	Gardendale St.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Note: SC – Street Car Alternative; LRT – Light Rail Transit Alternative; MLV – Low Speed Maglev Alternative.

Table 2.9 – Guideway Alternatives: Proposed Stations

City	Station	East Bank Alternative			West Bank Alternative 1			West Bank Alternative 2			West Bank Alternative 3		
		SC	LRT	MLV	SC	LRT	MLV	SC	LRT	MLV	SC	LRT	MLV
PEROW/WSAB Corridor													
Paramount	Green Line (new)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Paramount Blvd./ Rosecrans Ave.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bellflower	Bellflower Blvd.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cerritos	183rd St./Gridley Rd.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Artesia	Pioneer Blvd.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cerritos	Bloomfield Ave.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cypress	Cypress College	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Anaheim	Knott Ave.	✓	✓		✓	✓		✓	✓		✓	✓	
Stanton	Beach Blvd.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Garden Grove	Magnolia St.	✓			✓			✓			✓		
	Brookhurst St.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Euclid St.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Garden Grove/ Santa Ana	Harbor Blvd.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Southern Connection Area													
Santa Ana	Harbor Boulevard/1st Street/SARTC Alternative												
	Harbor Blvd./1st St.	✓	✓	--	✓	✓	--	✓	✓	--	✓	✓	--
	1st St./Fairview St.	✓	✓	--	✓	✓	--	✓	✓	--	✓	✓	--
	1st St./Bristol St.	✓	✓	--	✓	✓	--	✓	✓	--	✓	✓	--
	SARTC	✓	✓	--	✓	✓	--	✓	✓	--	✓	✓	--
	Westminster Boulevard/17th Street/Main Street Alternative												
	Westminster Blvd./ 17thSt./Bristol St.	✓	✓	--	✓	✓	--	✓	✓	--	✓	✓	--
	Main St./Civic Center Dr.	✓	✓	--	✓	✓	--	✓	✓	--	✓	✓	--

Note: SC – Street Car Alternative; LRT – Light Rail Transit Alternative; MLV – Low Speed Maglev Alternative.

Station Parking

Based on initial work sessions with the Corridor cities, existing and proposed guideway station parking opportunities were identified and are presented in Table 2.10. Any future planning and design efforts would quantify the parking demand resulting from the provision of Corridor guideway service. For example, for the Metro Gold Line, parking is provided at nine of 21 stations with the number of spaces ranging from 43 to 290, with the two terminal stations having 413 (Atlantic) and 1,010 (Sierra Madre Villa) spaces, reflecting the station's role and adjacent land uses. Detailed discussions would be held with Corridor cities to identify the fit of station area parking with surrounding land uses and future development plans.

Table 2.10 – Guideway Alternatives: Proposed Station Parking

City	Station	Alternative	Notes
Los Angeles	Union Station	All	Existing surface and structured parking; no new parking proposed.
South Gate	Firestone Boulevard	All	Part of future station area development plans.[1]
Downey	Green Line Lakewood Blvd. Station	MOS[2]	Existing 545 surface parking spaces; beyond capacity with spill-over parking in adjacent residential areas.
Paramount	Green Line Station (new)	All	Small station site in residential neighborhood; some parking may be provided.
Bellflower	Bellflower Blvd.	All	Part of future station area development plans.[1]
Cerritos	183rd St./Gridley Rd.	All	Part of future station area development plans.[1]
Artesia	Pioneer Blvd.	All	Part of future station area development plans.[1]
Cerritos	Bloomfield Ave.	All	Existing surface parking for Target; future parking structure for station, Target, and retail uses.[1]
Cypress	Cypress College	All	Proposed future station area parking structure for college and station parking.
Stanton	Beach Blvd.	All	Part of future station area development plans.[1]
Garden Grove	Brookhurst St.	All	Part of future station area development plans.[1]
	Euclid St.	All	Future downtown parking structure may include station parking.[1]
Garden Grove/ Santa Ana	Harbor Blvd.	All	Future Street Car station on east side of Harbor Blvd. with surface parking. This project's station and parking to be either co-located or sited on west side of Harbor Boulevard.[1]
Santa Ana	SARTC	SC, LRT	Part of future station area development plans.[1]

Notes: All – all three guideway alternatives; SC – Street Car Alternative; and LRT – Light Rail Transit Alternative.
[1] Initial city interest to include transit system parking in future development plans.
[2] MOS – Minimum Operable Segment station if the project was built in segments.

2.3.5 Alignment Alternative Challenges

While reuse of the former PE ROW offers the unique opportunity to implement transit service along a dedicated 20-mile ROW for approximately 60 percent of the proposed project length, introduction of a new high capacity transit system would have both benefits for and impacts on existing communities and transportation infrastructure. Beyond the dedicated ROW, there are significant challenges to providing transit service connecting north through downtown Los Angeles and south through downtown Santa Ana to serve the Corridor's major residential, employment, and cultural centers. This section presents an overview of the construction, operational, and jurisdictional constraints and challenges related to

implementing the alignment alternatives considered in this AA study. It should be noted that the resulting assessment is based on the approximately five percent AA-level of engineering design work.

Northern Connection Area

In this portion of the Corridor Study Area, the BRT and guideway alternatives would have significantly different operating alignments. The BRT alternatives would operate on the Corridor's highway system: the HOV Lane-Running Option would run primarily in the Harbor Transitway and I-105 HOV lanes, while the Street-Running Alternative would operate entirely within city streets. The guideway alternatives would run primarily within the ROW of inactive and active railroad ROWs, some owned by Metro and others by freight railroads, with some city street operations in the cities of Vernon and Los Angeles. BRT operation on railroad ROWs was not considered as the Federal Railroad Administration (FRA), under whose jurisdiction freight operations fall, typically prohibits bus operations with freight operations. Implementation challenges and constraints are discussed below and illustrated in Figure 2.17.

The two BRT alternatives follow different routes to reach downtown Los Angeles and have different interface points with the urban and regional rail system: the HOV Lane-Running Alternative would start and end at the 7th/Metro Center Station providing access to the existing Metro Red, Purple, and Blue lines today, and the Gold Line in the future with completion of the Regional Connector and the Exposition Line; and the Street-Running Alternative would interface with Union Station with connections to the Metro Red and Gold lines, regional Metrolink system, and intercity Amtrak system. The BRT Alternatives would have the following challenges in this portion of the Corridor:

1. *I-110/Harbor Transitway/HOV Lane Capacity*
   - The BRT HOV-Lane Running Alternative would operate south from the 7th/Metro Center Station along streets in the City of Los Angeles to enter the I-110/Harbor Transitway, and would serve the four existing Transitway stations. It would then run in the I-105 HOV lanes to the Lakewood Boulevard exit to provide a transfer to the Metro Green Line and travel south on Lakewood Boulevard to access the PEROW/WSAB ROW. Based on an initial assessment, there appears to be sufficient station and travel lane capacity to accommodate the proposed peak hour service. BRT travel speeds and times may be constrained on the I-105 in the eastbound direction during the morning peak period and westbound in the evening peak period.
2. *Interface with Metro Green Line*
   - Both BRT alternatives would provide a transfer to the Metro Green Line at the Lakewood Boulevard Station. The viability of the HOV Lane-Running Alternative serving the three other Green Line stations between the Harbor Transitway and Lakewood Boulevard Station was assessed at a conceptual level. Providing access to these stations was not recommended due to the circuitous and often congested freeway and street system access and egress travel paths, which would have a negative impact on travel times and ridership.
3. *Operating on City Streets*
   - The BRT Street-Running Alternative would operate south from Union Station on city streets, including Soto Street, Slauson Avenue, Pacific Boulevard, Long Beach Boulevard, Firestone

Boulevard, and Lakewood Boulevard in the cities of Los Angeles, Vernon, Huntington Park, South Gate, Downey, Paramount, and Bellflower. A majority of these streets are heavily congested during both peak periods, and current bus service experiences significantly reduced travel speeds and increased travel times. Bus travel delays occur even with the bus signal priority system on Soto Street within the City of Los Angeles. Adding more bus service to these congested streets would add to the capacity and speed challenges. Even with limited stops and extension of the bus signal priority system, this proposed alternative may not result in improved travel times as demonstrated by the former Metro Rapid 751 Soto Street service.

All of the guideway alternatives would have the segment from the end of the PEROW/WSAB Corridor ROW in Paramount north to Randolph Street in Huntington Park in common, and then would operate on one of four route options connecting north to Union Station. Travel in this common segment would occur along the San Pedro Subdivision now owned by the Ports of Long Beach and Los Angeles.

Initial conversations with the Ports identified an interest in selling this railroad ROW for transportation use by Metro. Purchased from the Union Pacific (UP) as part of a ports-area railroad purchase agreement, UP would have the first right to reacquire the ROW. In addition, this ROW was identified under an Alameda Corridor Transportation Authority (ACTA) agreement as providing emergency freight service route to/from ports area in case of impaired Alameda Corridor operations. Based on an initial review of the ACTA agreement, use of the San Pedro Subdivision would require provision of a freight track along with the new transit system's needs. Any subsequent planning and engineering, efforts would require more detailed legal research and agency discussions, such as with the FRA and the CPUC concerning the joint use of a freight ROW by passenger guideway service. The Street Car and LRT alternatives would share the ROW, either physically or temporally (with time separation), while the Low Speed Maglev Alternative would operate above the ROW. While FRA guidance has been provided locally on shared LRT-freight use of a ROW, no guidance has been provided on shared Street Car-freight operations, and given the lighter vehicular design may not be possible.

North from the San Pedro Subdivision where it crosses Randolph Street in Huntington Park, there are four route options providing service to Union Station:

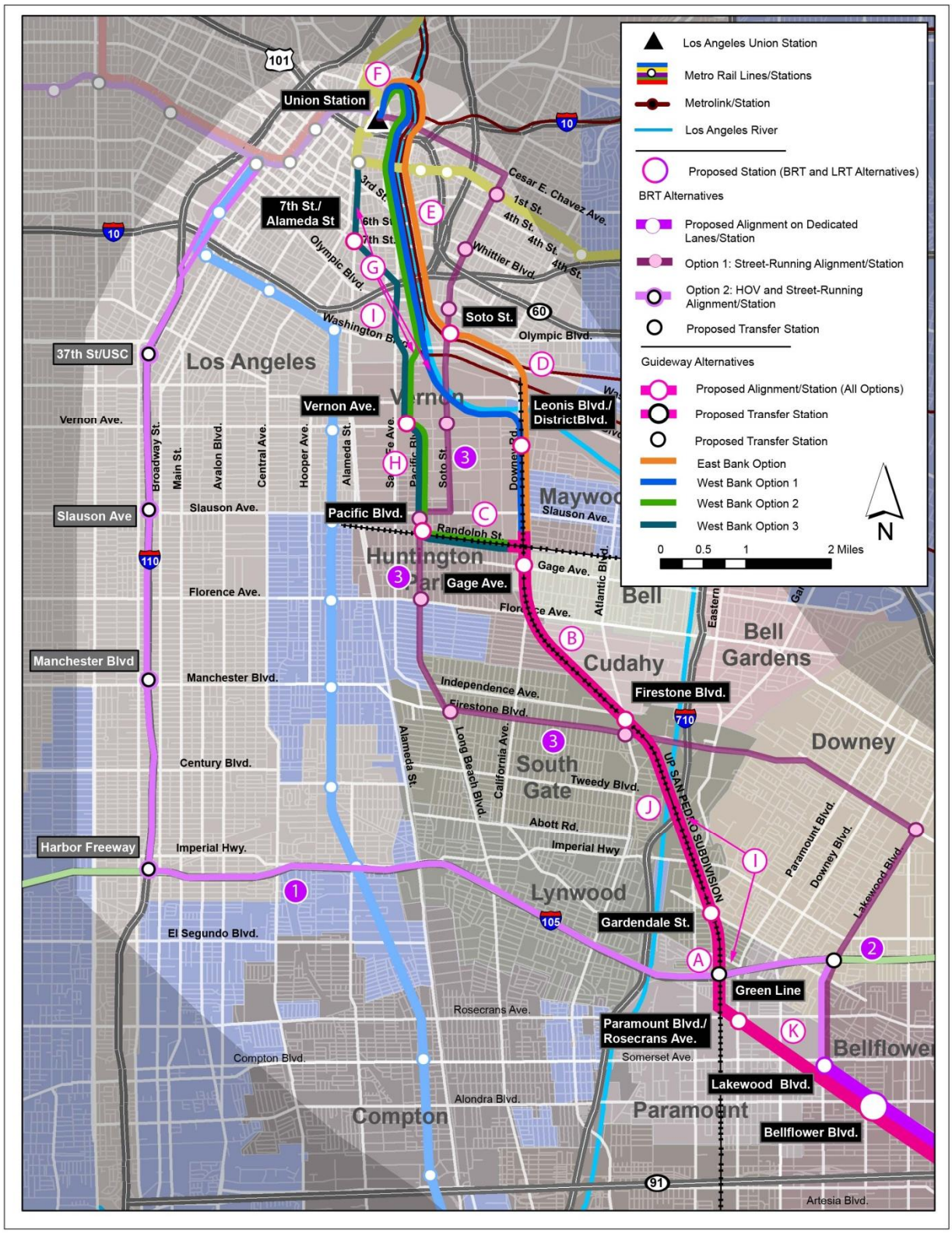
- *East Bank Alignment Alternative* – This alignment would continue north along the San Pedro Subdivision to travel over a Burlington Northern-Santa Fe (BNSF) railroad crossing north of Bandini Boulevard, and run in an aerial configuration across a portion of BNSF's Hobart Intermodal Yard to where the ROW intersects with a UP-owned ROW. This heavily-utilized ROW connects Los Angeles and points east such as Riverside, and serves freight and Metrolink and Amtrak passenger rail service, and may accommodate future California HSR service. The new transit line would share the UP ROW for a short distance to where the ROW, now owned by Metro and operated by Metrolink, turns north to travel along the east bank of the Los Angeles River, and then crosses over the river to enter into Union Station.

- *West Alignment Alternative* – This alignment would turn west to operate in a former railroad ROW located in the median of Randolph Street. The West Bank Alternative has three sub-options:
  - The West Bank 1 alternative runs along the west bank of the river first in the bank edge area that appears vacant and then would share the Metro-owned ROW to Union Station with Metrolink and Amtrak services.
  - The West Bank 2 option operates in the median of Randolph Street through Huntington Park, and turns north to operate in the median of Pacific Boulevard to the Metro-owned Harbor Subdivision. It would use this ROW, crossing over the Redondo Junction, and operate north along the Los Angeles River in a route similar to the West Bank 1 Option.
  - The West Bank 3 alternative follows the same initial route as West Bank 2 north along Pacific Boulevard, but continues north on a combination of the Harbor Subdivision, city streets, and private property in an aerial and underground configuration to daylight south of the Metro Gold Line Little Tokyo Station. Currently, this option is proposed to use the existing Gold Line tracks to reach Union Station.

In addition to the coordination requirements with multiple railroads, passenger service agencies, and state and federal agencies, implementation of the guideway alternatives would have the following challenges:

A. *New Metro Green Line Station*
   - *Cost and Green Line service interruptions* – A new station would be required to provide a connection to the Green Line for a new transit system operating on the San Pedro Subdivision. Construction of a new station on a heavily-used urban rail line would be challenging. Previous Metro plans had looked at another Green Line station in the vicinity of the I-710, and this would be a logical location given the opportunity of providing a high-capacity connection to and from downtown Los Angeles and the densely-populated Gateway Cities subregion and Orange County. A conceptual cost has been identified and included in the capital cost estimates. While a contingency factor has been applied, this cost may increase during possible future engineering and environmental work due to conditions and requirements not known during AA design work.
   - *Fit with freeway median and operational impacts* – With the Metro Green Line operating in the median of the I-105 Freeway, expansion of the median to accommodate a new station, along with the resulting impacts on freeway operations at this complicated system point where the I-105 Freeway interfaces with the I-710 Freeway, would be challenging. Conceptual-level station plans were developed and discussed in an initial meeting with California Department of Transportation (Caltrans) staff. Caltrans identified the requirement that the final station design must maintain the current number of freeway lanes; the conceptual station plans did fit within the existing ROW with shifting of freeway lanes. Adding a station at this location may disrupt freeway operations during construction, and mitigation plans would need to be developed.

Figure 2.17 – Implementation Challenges and Constraints



- *New station access* – The San Pedro Subdivision passes over the I-105 Freeway and the Green Line in a single-track bridge. It would have to be rebuilt to provide sufficient width to accommodate new guideway service and passenger platforms and circulation elements providing access to the new Green Line station, along with replacement of the freight rail track.

B. *San Pedro Subdivision owned by Ports of Long Beach and Los Angeles*

- *Subdivision availability* – While the Ports have expressed initial interest in selling the ROW for the project, this alignment currently is part of an ACTA agreement to provide emergency freight service and UP has the first right to repurchase the ROW.
- *Freight rail compatibility issues* – While the San Pedro ROW currently provides service to a small number of customers, any use of the ROW must be designed to accommodate freight rail operations and maintenance along with new passenger rail use unless the ACTA agreement is revocable or has a timeframe that will expire.
- *Approvals required* – Any operational change to the San Pedro Subdivision, especially the introduction of passenger rail service, would require close coordination with and the approval of the Ports, UP, FRA and CPUC.

C. Operate on inactive or active railroad lines

- *UP agreement required* – For the West Bank 2 and 3 alternatives, reuse of the inactive railroad ROW located in the median of Randolph Street would require an agreement by UP to vacate as there is insufficient room for both passenger and freight rail service in portions of the ROW.

D. Interface with the BNSF and UP Railroads and the future CHST system for East Bank Alternative

- *BNSF agreement required* – For the East Bank Alternative, the ROW would interface with a BNSF-owned crossing and BNSF's Hobart Intermodal Yard. Approval of the BNSF to cross their facilities would be required.
- *UP agreement required* – The proposed East Bank alignment would operate in and/or above an UP-owned ROW, known as the San Gabriel Line, that accommodates both freight and Metrolink passenger rail service. The trackage in this segment is highly utilized and nearing capacity, and adding new service in this area will be challenging. Sharing the freight ROW would require approval by the FRA and CPUC.
- *Fit with future CHST system* – One of CHST alignments providing connecting service south to Anaheim is proposed along this portion of the UP ROW. Future transit system plans may need to consider the physical fit with the high speed system.

E. Operate on Metro-owned tracks with UP freight and Metrolink passenger rail service

- *Fit with current ROW usage* – The East Bank Alternative would operate on the ROW along the eastern bank of Los Angles River owned by Metro and operated by Metrolink. This heavily-utilized set of tracks provides access for Metrolink passenger rail service into Union Station and freight rail access to UP's Intermodal Yards. Sufficient track capacity appears available, but passenger rail service may not be operationally viable.

F. Access into Union Station

- *Constrained Union Station capacity* – Union Station trackage and passenger platforms are beyond capacity due to the current and future levels of Metro Gold Line, Metrolink, and Amtrak passenger train activity. It also is proposed to serve as a hub for the future CHST system, which would push Union Station beyond its physical capacity and may require provision of a second track level. Train access through Union Station's "throat" is also beyond capacity due to the limited number of tracks and the curving alignment which restricts operating speeds.
- *Replace Los Angeles River Bridge* – The existing railroad bridge crossing the Los Angeles River, while sufficient to handle current Metrolink activity, would require retrofitting or replacement to accommodate increased usage by a project resulting from this AA study. Revisions to or replacement of the bridge would require coordination with a number of agencies and entities, including the U.S. Army Corps of Engineers (USACE) due to the crossing of the Los Angeles River.

G. West Bank Operational Viability and Access Constraints

- *West Bank Alternatives 1 Access* – Based on AA-level engineering and site analysis work, the West Bank 1 alignment would be precluded by an existing system of high tension electrical towers. There is insufficient room along the river's west bank edge to accommodate a new transit system without significant property takes.
- *West Bank Alternatives 2 Access* – As noted above, this alternative would require UP's agreement to vacate the Randolph Street ROW. While not used for freight rail service, it does provide a connection to a track along the Metro Blue Line that is currently used to store empty rail cars. Access into Union Station would be via a potentially expensive crossing of the heavily-utilized Redondo Junction. It then would share a ROW along the west bank of the Los Angeles River used by Metrolink and Amtrak operations, along with the Metro Red Line maintenance and storage facility. This alternative would connect into Union Station through the constrained track throat.
- *West Bank Alternatives 3 Access* – Similar to West Bank Alternative 2, this alternative would require UP's agreement to vacate operations in the median of Randolph Street. Traveling north, both the West Bank 2 and 3 alignment alternatives would travel along Pacific Boulevard, a former Red Car route, where they would connect with and operate along the Metro-owned Harbor Subdivision. The West Bank 3 alternative would run in a combination of aerial and underground operations that would daylight south of the Metro Gold Line Little Tokyo Station where it would use the existing at-grade Gold Line tracks to access Union Station. The proposed configuration would require refining to address daylighting impacts on Alameda Street, interface with the future Regional Connector, and whether the Metro Gold Line tracks have sufficient capacity to accommodate additional traffic.

H. *Assess City Traffic Impacts*

- Whether the proposed transit system operates at-grade or in a grade-separated configuration, introduction of a high-capacity transportation system would impact city street operations. As discussed in Chapter 3.0, at-grade systems may result in impacts requiring mitigation, including loss of traffic capacity and on-street parking and traffic flow impacts. Impacts from above-grade

systems may include loss of street capacity, left-turn lanes, and on-street parking due to column placement.

I. *Freeway Crossings*

- In this portion of the Corridor, the proposed guideway alignments would cross under or over three freeways – the US-101, I-10, and I-710 – in addition to the I-105 as previously discussed. The Street Car and LRT alternatives have been designed to operate under the three freeways: for the US-101 and I-10 on streets and/or rail ROWs; and under the I-710 in an existing undercrossing; all have sufficient width and height to accommodate at-grade operations. Both modal alternatives would run in a new bridge over the I-105 as discussed above. Due to the grade-separated operational requirements of the Low Speed Maglev Alternative, all of the alignment options would require structures over this area's freeways. While the other freeway crossings would be approximately 16.5 feet to the bottom of the guideway structure, the I-105 crossing would be significantly higher (approximately 50 feet to the bottom edge) due to the need to not only be above the freeway envelope, but also above the existing freight rail bridge and freight operations.

PEROW/WSAB Area

In this portion of the Corridor, all of the proposed alternatives were designed to operate along the Metro and OCTA owned former PE ROW. While the ROW width of 75 to 195 feet provides more than sufficient space to accommodate the average 28-foot width required for at-grade operations or placement of columns, several cities have strongly requested that the BRT alternative not run on the ROW, but along adjacent city streets. Reuse of this ROW offers a unique opportunity to implement a high-capacity transit project with travel speed and time benefits, but due to the predominant adjacent land use being residential in this section, any project would also result in noise and vibration, visual and privacy, safety, and circulation impacts requiring mitigation as discussed in Chapter 4.0. In the PEROW/WSAB Area, all of the alternatives would have the major challenges discussed below and illustrated in Figures 2.17 and 2.18:

J. *Address Water Crossing Issues*

- In all portions of the Corridor, the proposed alignments would cross and interface with a wide variety of rivers, creeks, and flood channels. In Los Angeles County, the proposed alignments cross the Los Angeles River twice, the San Gabriel River, and the Coyote Creek Flood Control Channel at the county line. In addition, a portion of the ROW is used for a flood channel in the southern portion of Los Angeles County. In Orange County, the proposed ROW crosses the Santa Ana River and a number of flood channels. Existing bridges are primarily single track and would have to be widened or replaced to accommodate a new high-capacity transit system. Based on an initial field and record review of the possible crossings, there appears to be no insurmountable engineering issues; any construction would require input from and approval of the USACE and county flood control agencies.

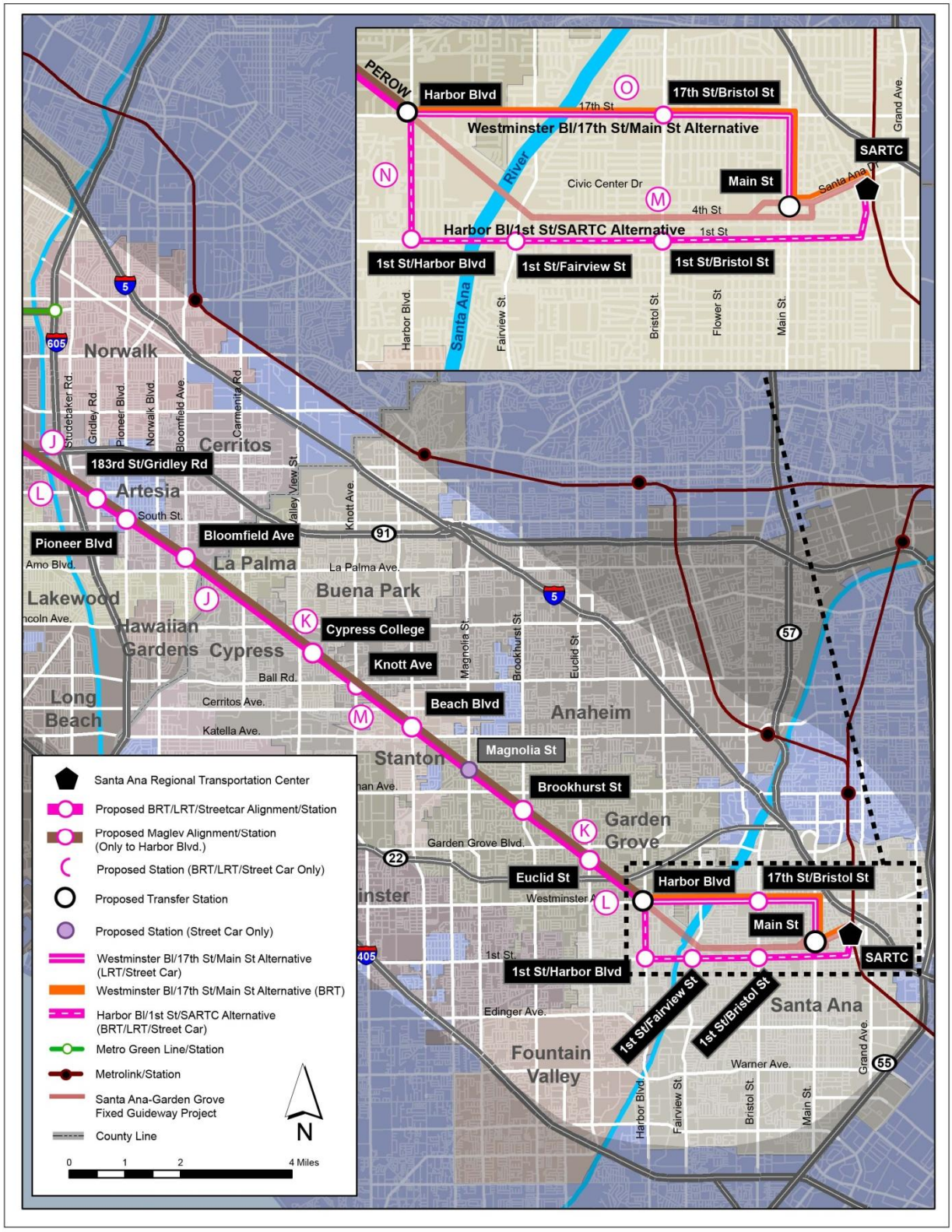
K. *Encroachments on the ROW*

- *Use encroachments* – A constraints analysis performed for the PEROW/WSAB ROW identified public and private encroachments onto the former PE ROW. The encroachments in Los Angeles County include several commercial uses or their parking located on the ROW, and in the City of Paramount, Metro has leased land for an oil line that runs along the ROW to provide service to the Paramount Petroleum Facility. In addition, there is a pedestrian bridge over the ROW connecting portions of Paramount High School that are located on opposite sides of the ROW. In Orange County, there have been several major ROW encroachments that have occurred with OCTA's concurrence. A portion was sold to the City of Garden Grove for a commercial development project and related parking, with aerial rights reserved for a future transit project; the City of Buena Park has two small parks located on the ROW; and OCTA uses a portion of the ROW for temporary bus storage purposes. In the City of Santa Ana, residential, commercial and industrial properties have been built on the ROW as it enters the downtown area over the years. Except for the Santa Ana development, none of the encroachments appear to preclude implementation of a future project; they will need to be considered as more detailed design and operational plans are developed.
- *Utility Issues* – As part of the ROW constraints analyses, existing utilities were identified and located. There are a significant number of underground utilities, typically under the streets crossing the ROW, as well as major overhead utility lines crossing or running along the ROW. Minimizing impacts to existing utilities would need to be considered in future engineering plans.

L. *Freeway Crossings*

- In this portion of the Corridor, the proposed system alignments would cross under or over three freeways – the SR-91, I-605 and SR-22. The BRT, Street Car, and LRT alternatives were designed to operate under the freeways: the SR-91 and I-605 freeways have existing undercrossings that provide sufficient width and height to accommodate at-grade operations; and the alignments would circulate under a SR-22 bridge. It should be noted that future plans call for the ROW to be used for vehicular off-ramps from the SR-22 onto the ROW to provide circulation into the City of Santa Ana. In that case, all proposed alternatives would be required to cross above the SR-22. Due to the grade-separated operational requirements of the Low Speed Maglev Alternative, all of this option's alignments would require structures over area freeways. Based on the high number of adjacent residential uses, this alternative's freeway crossings would have significant visual impacts. The Low Speed Maglev Alternative's freeway crossings require a structural transition from a guideway structure 16.5 feet above the ROW to one 16.5 feet above a raised freeway surface. In this area, the resulting structures would be approximately 40 feet to bottom of the structure crossing over the I-605, and 50 feet to cross the SR-22, or a 23.5 to 33.5 foot transition. In all freeway crossing locations, there is insufficient space for the provision of integrated pedestrian and bicycle facilities, and alternative routing would be required.

Figure 2.18 – Implementation Challenges and Constraints



M. *Assess City Traffic Impacts*

- *Street system Impacts* – As stated above, introduction of a high-capacity transportation system improvement would have impacts to city street operations. At-grade systems may result in impacts to traffic capacity and flow, and the removal of on-street parking. Grade-separated systems may result in the loss of street capacity, left-turn lanes, and on-street parking due to column placement.
- *Challenges of diagonal street crossings* – The ROW runs at a diagonal between the cities of Paramount in Los Angeles County and Santa Ana in Orange County with 56 roadway crossings along its 20-mile length – approximately three crossings per mile. Of the total crossings, 46 of the streets are classified as primary or secondary arterials, while the remainder is identified as local or collector streets. The highest number of crossings occurs in the City of Garden Grove (21), followed by the City of Bellflower (six), and then the cities of Paramount, Cerritos, Artesia, and Stanton (five each). An initial assessment of traffic impacts resulting from implementation of a new high-capacity transit system was prepared and an overview of the results is presented in Chapter 3.0. The assessment included a review of the existing geometric layout and number of lanes to identify conceptual impacts. The ROW passes through only two intersections – Paramount Boulevard/Rosecrans Avenue in Paramount and Gridley Road/183rd Street on the border of the cities of Cerritos and Artesia – all of the other crossings occur midway through the impacted roadway segment.

  Aerial operations typically result in minor or no traffic impacts, with only some impacts coming from the system's structural design where it crosses over intersected roads. Due to span constraints, wider street widths may require placement of an intermediate column in the roadway. Outrigger structures are typically used and allow maximum length of 220 feet. While aerial structures minimize traffic impacts, the support elements do have physical and visual impacts on adjacent communities. At-grade transit systems, whether BRT, Street Car, or LRT, would require gates and sound equipment, and possibly signalization, to allow for the safe crossing of transit vehicles. While transit vehicle are in the roadway for a short time (5-10 seconds), the gate crossing bells may have noise impacts on adjacent land uses unless mitigated. During any subsequent preliminary engineering and environmental review efforts, the decision on whether to grade separate future transit service in Los Angeles County would be guided by Metro's grade separation policy.

Southern Connection Area

In this portion of the Corridor, a majority of the alternatives would operate along one of two alignment options connecting south to the SARTC. The exception is the Low Speed Maglev Alternative, which would end at Harbor Boulevard with passengers transferring to the Santa Ana-Garden Grove Fixed Guideway Project to complete their trip. As illustrated in Figure 2.18, the BRT, Street Car, and LRT alternatives would leave the former PE ROW to operate on one of two alternative routes:

- Harbor Boulevard/1st Street/SARTC Alternative would leave the Corridor ROW after a future Harbor Boulevard Station to travel south on Harbor Boulevard, east on 1st Street, and then north on a

realigned Santiago Street to the SARTC.

- Westminster Boulevard/17th Street/Main Street Alternative would serve the future Harbor Boulevard Station and then travel east on Westminster Boulevard/17th Street, and south on Main Street where riders would transfer to future Santa Ana-Garden Grove Street Car system to travel to the SARTC.

In the Southern Connection Area, all of the alternatives are currently proposed to operate in an at-grade configuration with the following implementation challenges and constraints:

N. *Assess City Traffic Impacts*
   - Both alignment alternatives would have the impacts on city street operations with similar impacts to those discussed above for at-grade operations. The Westminster Boulevard/17th Street/Main Street Alignment was identified as having a higher level of traffic impacts with 90 percent of the alignment's intersections having geometric impacts compared to 50 percent of the Harbor Boulevard/1st Street/SARTC Alignment's intersections. There would be significant traffic impacts on Main Street through downtown Santa Ana due to a constrained street ROW width – only two through lanes in each direction compared to three through lanes for all of the other streets in the alignment options.

O. *Address Impacts on Sensitive Land Uses and Cultural Resources*
   - Implementation of high-capacity transit service along both alignment alternatives would have impacts on adjacent residential neighborhoods and retail development; though land use plans do identify future development opportunities along 1st and Santiago Streets. In addition, there are a large number of historic and cultural resources eligible for and/or listed on the National Register, state, and local historic resource lists in the civic center and downtown areas of Santa Ana. The narrow Main Street segment of the Westminster Boulevard/17th Street/Main Street Alternative is lined with a significant number of historic buildings.

2.3.6 Final Screening Evaluation Criteria

The Final Set of Alternatives were studied and evaluated based on conceptual-level engineering and operating design, station location, capital and operating cost estimates, ridership forecast modeling, and community and environmental impact analysis. The resulting comparative analysis of the alternative-specific technical information, along with public and stakeholder input, will provide the public and decision-makers with the basis to identify the recommended alternative, or phasing of alternatives, which addresses Corridor mobility needs and capacity requirements in the year 2035 and beyond. The recommended evaluation criterion was based on: local goals identified during Project Initiation involvement efforts, applicable criteria of possible implementing and funding agencies, and findings of the Corridor Mobility Problem and Need analysis. The identified criteria are intended to reflect the broad range of benefits and impacts that may be realized by the implementation of a proposed transit project.

The resulting PEROW/WSAB Corridor criteria are grouped in the following five categories and presented with related performance measures in Table 2.11:

1. *Public and Stakeholder Support* – the level of community, stakeholder, and jurisdictional support for the project.
2. *Mobility Improvements* – the level to which the project improves local and regional mobility and accessibility by minimizing congestion, increasing travel reliability, and improving access to and from key activity centers and destinations.
3. *Cost-Effectiveness/Financial Feasibility* – how the project costs are balanced with expected benefits, and how the project funding needs fits within available funding resources.
4. *Land Use and Economic Development* – how the project supports local and regional land use and development plans and policies
5. *Environmental Benefits and Impacts* – the extent to which the project provides additional travel capacity, while minimizing environmental and community impacts, and balancing distribution of benefits, impacts, and costs by mode, household income, and race/ethnicity.

Table 2.11 – Final Screening Evaluation Criteria

Criteria	Performance Measures
1. Public and Stakeholder Support	• Provide a desirable solution to the community and stakeholders. • Have city/jurisdictional support.
2. Mobility Improvements	• Improve travel speeds and reduce travel times. • Provide connections to the regional rail system. • Increase range of transportation options. • Serve current and future travel growth and patterns. • Serve both community and regional trips. • Make transit a viable alternative as measured by resulting ridership and new riders. • Increase access to and from Corridor activity centers and destinations. • Increase service for transit dependent Corridor residents. • Provide improved cross-county line transit service. • Provide an integrated pedestrian and bicycle system.
3. Cost-Effectiveness/Sustainability	• Balance project costs with expected benefits – resulting construction and operating costs are balanced by strong ridership (cost-effectiveness). • Identify transportation alternatives that are financially sustainable with identified resources.
4. Land Use/Economic Plans	• Provide station spacing that supports local economic development and revitalization plans and job strategies. • Serve areas with transit supportive land use policies.

Table 2.11 – Final Screening Evaluation Criteria

Criteria	Performance Measures
5. Project Feasibility	• Fit with current local transit system operations or plans. • Has state and federally approved vehicles, and is operational in the U.S.
6. Environmental Benefits and Impacts	• Minimize environmental/community impacts • Improve air quality by reducing tailpipe and Greenhouse Gas emissions • Minimize the number of properties to be acquired. • Assess environmental justice impacts

The comparative analysis of the Final Set of Alternatives is presented in the following chapters and summarized in Chapter 7.0, Comparison of Alternatives and Recommendations.